

Current and
upcoming
course syllabus

BAKERSFIELD COLLEGE

AUTOMOTIVE TECHNOLOGY



SYLLABUS

CRN # 71175 and 71176

B30-01 & B30-02

Introduction to Automotive Electrical

10/16/17 – 12/07/17

INSTRUCTOR: Andrew Haney

OFFICE HOURS: Monday – Thursday, 7:00am – 8:00am (appointment for another time)

INSTRUCTIONAL LAB & CLASS HOURS:

Monday - Thursday 8:00am to 11:00am & 1:00pm to 4:00pm

PHONE: 661-395-4574 (if no answer, leave a message, expect up to a 24hr response time)

E-MAIL: andrew.haney@bakersfieldcollege.edu

COURSE OBJECTIVES

This course will cover the fundamentals of automotive electricity, electrical and electronic systems. It will prepare the student to take the ASE A-6 and A-8 examinations for certification. We will explore the theory of electricity and how it is used in the modern automobile. This will include diagnosis and repair of many automotive electrical systems including the battery, starting and charging systems, ignition system, computer controlled engine, transmission and accessory systems. In the laboratory we will learn to use, and identify many types of common diagnostic test equipment to find and repair automotive electrical problems.

STUDENT LEARNING OUTCOMES:

1. evaluate the integrity of electrical and electronic circuits using wiring diagrams and the principles of Ohm's Law.
2. assemble basic electrical circuits, perform electrical measurements with Industry recognized tools and procedures.
3. analyze battery, starting and charging system faults and be able to formulate a diagnostic strategy.
4. COURSE OBJECTIVES a) Students will learn the meaning and application of Ohms Law b) Students will understand how to read wiring diagrams c) Students will learn how to read and use a voltmeter d) Students will learn testing strategies for electrical circuit faults e) Students will learn the laws for aiming and adjusting headlights

STUDENTS WITH DISABILITIES:

Students with disabilities needing accommodation, including those who had an IEP in high school, should make requests to Disabled Students Programs and Services (DSPS) Counseling Center, CSS 10 or Delano room 1001 (661-395-4334, (661-720-2000 Delano)). **All requests for accommodations require appropriate advanced notice with a written form from DSPS to avoid a delay in services in the classroom or lab and must be provided by the end of the first week.** The instructor, or any other faculty member or student aid instructing is the course is not responsible for a delay in services or deductions in grades for a lack of services if this form is not provided on time. You must discuss approved accommodations with me so we can work together to ensure your access and success at BC.

TENTATIVE COURSE SCHEDULE:

This is subject to change depending on the maturity in this discipline by all students throughout the course. **Industry and lecture materials are used often and will require extra study at home and away from school.** You will be expected to do homework assignments from your book, MyAutomotiveLab, and other assigned materials or handouts. Lecture notes are highly suggested. The weekly schedule will be posted in your MyAutomotiveLab Calendar and is subject to change. It is your responsibility to check the calendar frequently for possible changes to due dates. Failure to do so may result in a (0) grade because an assignment was changed and not completed.

WEEK	MONTH	DATE	TOPIC	CHAPTERS
1	OCT	16 th – 19 th	SYLLABUS REVIEW ELECTRICAL FUNDAMENTALS CIRCUIT TESTERS AND DIGITAL METERS MULTI METER ESSENTIALS	39 42 INDUSTRY
2	OCT	23 rd -26 th	ELECTRICAL CIRCUITS AND OHMS LAW SERIES, AND PARALEL CIRCUITS CLASSROOM LAB WITH 12V CONVERTERS AND RESISTORS ILT-1200v2.1 ESSENTIAL ELECTRONICS VOLTAGE DROP TESTING LAB	40 41 INDUSTRY LAB
3	OCT / NOV	30 th -2 ND	BATTERIES BATTERY TESTING AND SERVICE CRANKING SYSTEM CRANKING SYSTEM DIAGNOSIS AND SERVICE LAB	50 51 52 53 LAB
4	NOV	6 TH -9 TH	CHARGING SYSTEMS CHARGING SYSTEM DIAGNOSIS AND SERVICE WIRING SCHEMATICS LIGHTING AND SIGNALING CIRCUITS LAB	54 55 INDUSTRY 56 LAB
5	NOV	13 TH -16 TH	INRODUCTION TO OSCILLOSCOPE AND GRAPHING MULTIMETERS OEM SCAN TOOL INTRODCUTION HYBRID VEHICLE INTRODUCTION LAB	43 INDUSTRY MATERIAL
6	NOV	20 TH -23 RD	INTRODUCTION TO ELECTRONIC FUNDAMENTALS AUDIO SYSTEM OPERATION, CONSTRUCTION, & DIAGNOSIS LAB	48 61 LAB
7	NOV	27 TH – 30 TH	LAB AND LAB FINAL	LAB FINALS
8	DEC	4 TH – 8 TH	FINALS WEEK	

EMAIL AND PHONE CONTACT:

Email and phone is the line of communications used outside of class. I expect that you will be checking your email each day for notifications, changes, and updates that come from faculty or students aids in this course. It is your responsibility to notify me if you do not have a way to check email.

It is expected that within a reasonable amount of time a response to an email message will be received. A reasonable time means a response will be given within 6-12 hours of original email messages.

If you are notified by, email that an exam or assignment time has change and you do not get your assignment turned in on time you will receive a “0” on that assignment. All emails are a legal document and used as proof of notification in all things. Be cautious of what information you put in email.

In addition to email, I may need to contact a student by phone. It is your responsibility to ensure your phone numbers are updated correctly in the BC system. I obtain your numbers from this system.

MATERIALS NEEDED:

1. Textbook: “Automotive Technology: Principles, Diagnosis, and Service Plus MyAutomotiveLab with Pearson eText—Access Card Package, 5/E” ISBN # **978013400908**
2. Three ring binder to hold book and notes
3. Notebook Paper: 8 ½ x 11
4. Safety glasses (if you wear glasses use full cover goggle type or provide instructor proof of polycarbonate safety lenses). Safety glasses must meet ANSI Z87.1 Standards; this number will be stamped on and industry approved safety glasses. **NO SAFETY GLASSES – NO LAB – NO EXCUSES**
5. Ear protection is furnished in the lab and must be worn when working near equipment producing high noise levels. It is your responsibility to ensure that you ask for ear protection before starting the project.
6. Mandatory for Electrical and Advanced Auto Electronics only. You can purchase a PowerProbe Volt meters at the bookstore or on line in multiple areas. We have also arranged for a student discount with direct purchases of these voltmeters through AESwave. You have to notify them you are student at Bakersfield College to receive the discount.

MY AUTOMOTIVE LAB

My Automotive Labs is a computer and internet based system. Your grade book is managed in this system so you can see your grade. However, your grade may not be accurate at any given time depending on items that need manual grade entries. This is a very large portion of your class and grade. You will be expected to use it. If for any reason, you are having issues with any assignment not working it is your responsibility to notify me or the other instructor aids assigned to this course of the issue. The following is what will be involved with My Automotive Labs.

1. Homework assignments
2. Quizzes
3. Exams
4. Handouts loaded to the document share board
5. Presentation loaded to the document share board
6. Discussion boards are optional but fun to use.
7. Email to other students. All personal email addresses are hidden and sent within this system when sending to other students.
8. Other assignments or uses may come about during the course depending on needs and maturity of the class in the discipline.

HOW TO REGISTER FOR MyAutomotiveLab:

1. Go to www.pearsonmylabandmastering.com.
2. Under Register, select Student.
3. Confirm you have the information needed, then select OK! Register now.
4. Enter your instructor's course ID: **haney51058**, and Continue.
5. Enter your existing Pearson account username and password to Sign In.
 - You have an account if you have ever used a Pearson MyLab & Mastering product, such
 - as MyMathLab, MyITLab, MySpanishLab, MasteringBiology or MasteringPhysics.
 - If you don't have an account, select Create and complete the required fields.
6. Select an access option.
 - Enter the access code that came with your textbook or was purchased separately from the bookstore.
 - Buy access using a credit card or PayPal account.
 - If available, get temporary access by selecting the link near the bottom of the page.
7. From the You're Done! page, select Go to My Courses.
8. On the My Courses page, select the course name B11 INTRODUCTION TO AUTOMOTIVE to start your work.

GRADING POLICY:

There is no grade of incomplete in this class. If you decide to drop this course be sure to make it official by notifying the Bakersfield College records office to prevent receiving an “F” grade for the semester. It is your responsibility to officially drop a class not the instructor’s if you choose to withdraw from a course.

TYPE OF ASSIGNMENT	PERCENTAGE OF GRADE
HOMEWORK	20%
QUIZZES PRE-AND POST	15%
EXAMS / TESTS	25%
SHOP/LAB MAINTENANCE AND CLEAN UP	10%
LAB AND TASK SHEETS	30%

Laboratory assignments may be added or removed as needed causing an adjustment in points scales.

A	90-100	EXCELLENCE
B	80-89	GOOD
C	70-79	AVERAGE
D	60-69	BELOW AVERAGE
F	0-59	FAILED

You must earn a letter grade of a “C” 70% or better in this course to advance into any course that this is a pre-requisite for.

Exams and quiz scores are totaled and averaged based on points. Exams carry a much heavier weight of points than quizzes and are during class time only. No cell phone is be allowed during any exam and is required to be on a table at the front of the classroom as designated by the instructor.

Tutoring help is available through the B.C. “Early Alert System” if you are having issues with other subject skills not taught in this course you can seek assistance through the tutoring center. It is to your benefit to alert the instructor of any issues you may be having.

Homework and all out-of-class projects must be turned in on the due date to avoid an “F” grade (0%) for that assignment. **NO EXCEPTONS** It is more important to complete your homework to the best of your ability. Included in this category will be your classroom notes.

All unfinished and incomplete assignments are managed each week in the MyAutomotiveLab system on Fridays. Any assignment not done will receive a (0) or “F” grade. This cannot be undone, changed, redone, or modified in the system. If you have an emergency that prevented you from completing your assignments and you need more time to complete it, you **MUST** seek approval before the Friday deadline. Otherwise, you will receive the grade issued when managed incomplete action are executed.

DISPUTES

From time to time students to student and instructor to student may experience personality conflicts that can fester hard feelings or sense of failure. In this class, it is imperative that you do not allow those feeling to go unknown until it becomes a major conflict or issue. Under state law we maintain a 100% open line of communication and freedom of speech. You are encouraged to speak openly your feelings about any subject within reason. If for any reason someone is offending you including the instructor, speak to that individual privately to seek a resolution for your concerns. If no resolution is formed then seek further help from the instructor or administration.

If you have a dispute or are struggling with the methods being used in and for instruction you **MUST** communicate this to the instructor instructing this course. This is the fastest way to have changes made or get the help needed to succeed in the course. No instructor at Bakersfield College is here to fail students. We are here to support, uplift, and help you enter the workforce as fast as possible. If this is not happening, we need to know immediately.

ATTENDANCE:

Bakersfield College Automotive Department attendance policy is that any student who has not completed all required safety training, including SP2, before the first census date will be dropped.

The Bakersfield College Attendance Policy states that “instructors may drop a student from a course when absence numbers the equivalent of two weeks of class recorded from the first day of instruction **based on a sixteen-week semester.**” In the case of distance learning, “absences” shall be defined as “non-participation.” Instructors may drop students after the equivalent of two weeks of non-participation from the first day of class. Non-participation shall be defined as, but not limited to:

- Not following the instructor’s participation guidelines as stated in the syllabus
- Not submitting required assignments
- Not contributing meaningful discussion in required chat rooms, discussion boards, or other online forums
- Not participating in scheduled activities
- Failure to communicate with the instructor as required

Bakersfield College Automotive Department operates its Automotive classes on an 8-week semester. As such the equivalent missed time to the Bakersfield College sixteen-week semester is four (4) days missed or one-week in total. In the case where an Automotive class operates on the sixteen-week semester schedule BC attendance policy will be followed. In this course missing more than 4 days will be cause for you being dropped from the course.

ASSESSMENT:

Assessment is a broad category and is subject to your personal motivation and attitude in class. The following are some of the areas that are monitored during class, and some of these are safety issues when in lab, they include:

1. Your contributions to classroom discussions
2. Your lab behavior, self-motivation, and work ethic (if you are standing around in lab it will be noted without notice and your grade will be adjusted)
3. Your cooperation with the instructor and class policies
4. Attendance, **absents itself does not affect your grade but failure to complete assignments does.** If you are absent you cannot participate causing a zero (0) grade on assignments, if you are absent you will not be given a chance to make up any lab work or assignments given on the day of your absence and you will receive a zero (0) on the assignments given.
5. Sleeping in class. Your notes affect your grade. If you are sleeping, you can't take notes. Part of life skills require knowing your limits and getting enough rest to be alert and attentive to your environment; it is your responsibility to yourself, and classmates to get enough rest each day. You will learn better when awake in class, and be more attentive to safety requirements in lab.
6. Lab requires you to be alert to your environment, if you are drowsy and are not alert in lab you will be dismissed from class for safety issues. This will result in a (0) grade for that lab assignment. You must be alert and awake during lab.

MAKE-UP POLICY:

If you are absent from a class when an exam or quiz is given, the instructor may, at his discretion, allow you to take it when you return. The only time available for this will be during the instructor's office hours before class and only by prior appointment with the instructor. All make up Exams and Quizzes are done electronically at the computer lab or classroom under supervision.

HANDOUTS:

Handouts are part of this class to supplement your textbook. They will be used for test questions in conjunction with your textbook and lecture. **If you are absent**, extra handouts will be in the basket to the rear or side of the classroom until gone and no more than three days after handout date if not posted in MyAutomotiveLabs.

SAFETY:

Safety is everyone's responsibility. You are responsible to look out for first yourself then your classmates, instructor, or anyone in the automotive area for safety violations or potential accidents. It is your responsibility to NOT use any equipment unless you know how. If you do not know how that is why you are here. Do not ask another student unless instructed by me or another instructor to show you how to use the equipment. Ask for guidance. You are responsible to read the safety booklet given out the first day of class, and return the signed sheet stating you have read this by the last day of class in the first week of the semester starting. After read the booklet feel free to ask me any question you may have regarding information provided in it.

SP2 CERTIFICATIONS:

Everyone is required to have current SP2 certification. This should have been done in B10 Auto Safety if not you must have this completed within the first week of class to stay in the course. You must turn in copies of the SP2 certification certificates to me to keep on file.

PREREQUISIT REQUIREMENTS:

This course has a prerequisite requirement of B10 Safety and B11 Introduction to Automotive. If you have not completed either of them please see me privately during office hours for direction. All students who have not met this requirement cannot be in this course.

PROHIBITED SUBSTANCES AND WEAPONS INCLUDE BUT NOT LIMITED TOO:

1. Possession of any kind of weapon or firearm. **Tasers are considered equal to firearms.**
2. Possession or use of any illegal drug.
3. Possession or use of any alcoholic beverage or use of such items before or during any class on school property.
4. **Smoking** or use of any tobacco products within the Automotive Technology AT-1 or AT-2 area or labs. State Law requires observance of smoking rules, and areas on all state-wide community college campuses, and they must be strictly adhered to. There are designated smoking areas for this. It is your responsibility to know where they are and use them if you smoke.

Any violation of the above can result in consultation with the dean of students, a drop from this course, or if severe enough, arrest resulting in felony convictions.

VEHICLE HOISTING REQUIRMENTS AND RULES

It is your responsibility to read the safety booklet given out and to show proficiency in the first week of lab assignments to learn proper lifting procedures. If a vehicle is to be hoisted or lifted it requires prior approval from the instructor. No vehicle is to exceed more than twelve (12) inches off the ground at any time without inspection. Hoisting a vehicle without approval or inspection from the ground is grounds for dismissal from class for one day and considered a safety violation.

TOOLS

Theft of tools, parts, or personal items will not be tolerated. This will result in possible removal from class permanently. You will be working with very expensive electronic tools some of which are school property, and some of which are personal property of Mr. Haney, or borrowed from and owned by industry companies to provide learning opportunities for you. You are expected to treat all tools with respect, keep them clean and free of damage, and do not leave them at any time in an un-secure position or location. If you are not sure how to use the tools properly, ASK. In-proper connection of the tools can damage them beyond repair requiring replacement.

PARTS PURCHASES:

As a student at Bakersfield College, you receive a discount on parts purchased through specific automotive parts supply stores. Please see the instructor for those stores and discounts. You are responsible to pay for your parts with the associated taxes. You at any time cannot use the BC accounts to purchase your parts. If you are going to repair your own vehicle make sure you are prepared to purchase the parts and accessories needed to do so, this includes shop supplies.

PARKING:

Student parking lots are located near the stadium and Northeast corner of the campus; a permit is required. If you are working on your vehicle, and have an instructor signed and approved repair order on the windshield, you may park in the shop bays, or under the canopy. All others will be cited under California Vehicle Code by campus security.

CELL PHONES AND OTHER ELECTRONIC DEVICES:

It is understood that technology is part of our daily lives and in many cases, it is needed for emergency contact issues with family or children. Your phones will provide resources that will help you throughout the course and you will be allowed to use them **EXCEPT** during exams or if otherwise noted by the instructor. No other instructor or aid can authorize you to use a phone, computer, or tablet when taking exams. If for some reason, you need to use your phone for a call or something other than the current assignment, or lecture these three rules must be followed:

1. Silence the phone, step out of class to take the call, Keep the call short and return to class immediately after the call.
2. If it is an emergency and you need to leave class, do not hesitate to interrupt and asked to be excused. (This will not make you exempt from the workload or assignments and you will be expected to make up the assignments or lecture time during office hours).
3. Phones are prohibited during test, unless the instructor states otherwise at the start of the test. All cell phone are on a table in front of the classroom during the exams no exceptions.

TIPS FOR SUCCESS:

Like most formal training, your gain will be measured by the time you put into study, by participating in class discussions, lab work, and by asking questions. The instructor cannot possibly know when you need further explanation of a subject being discussed unless you ask a question. Do not worry about what other students think about your questions, remember, the only thing gained from silence is ignorance.

While working in the lab, remember, you are receiving training to take a place in the workforce. This includes technical training, but of equal importance, it includes developing work ethics and habits. Treat everyone as if they are your customers. Be responsible for all tools and equipment as if you had personally purchased them. Be constantly aware of the safety of yourself and others around you. Always make the extra effort to do a job better than expected.

At Bakersfield College, as in the workplace, theft of tools, parts or personal items is not tolerated. If you develop a good reputation, both ethically, and morally, it will be priceless in your future. It follows you from job to job and is not changed quickly. Employers, fellow technicians and customers soon know about your past and will treat you accordingly.

THOUGHTS FROM INSTRUCTOR:

Over the past 27 years, the auto repair industry has been more and more about technical information and computerized test equipment. It is now essential in repairing the automobile.

We are seeing the days of just turning a wrench going away. Wrenching comes with experience and you will find many older generation technicians who are experts with their hands and add great value to this industry, but sadly they are lacking in the more technical aspects of today's auto repair and have no desire to learn the evolving technology. This is where you become important to the survival of this industry. Today it takes both skills! You are the next generation of technicians and you are our future. Without you, automobiles will not be repaired. The past is important to know and understand so do not lose sight of history, and you understand why things are the way they are today.

This course is designed test and try you in lot of ways. It has been designed to build on basic skills for both automotive repair and life. You should have already obtained some of these skills from other courses taken here at BC, or other institutions. This course can be very fast paced and very focused. You are training for a demanding industry that is only becoming more technical each day. Do not waste your time here, or assume this will be an easy class. Take advantage of every moment you must gain as much as you can. BC has some of the best instructors in the industry to help you. Take advantage of each one of their skills and strengths; build upon them with your talents, knowledge, and strengths. This is your moment in life to overcome challenges and weaknesses. Become who, and what you want to become. Time goes fast so do it now.

In closing, I would like to ask each one of you to think about a future situation. Which one of you will be standing in front of the class in twenty years teaching the things you learned in this industry? As you think about that, do what you need to do now to prepare for it. Gain as much formal education as you can and be ready to fill mine, or another instructor's shoes when needed. THANK YOU for letting me be a part of your life and I wish only the best for you throughout this course and going forward in your educational goals and life.

Syllabus Homework

******Due Next Class Period******

Full Name: _____

Briefly describe your automotive experience.

What automotive systems interest you most?

What do you expect to gain from this course?

I have read, reviewed, understand and agree to the syllabus.

Student Signature: _____

Contact Information:

E-mail address: _____

Contact phone number: _____

BAKERSFIELD COLLEGE

AUTOMOTIVE TECHNOLOGY
AUTO B39 ~ Fall 2017 ~ Afternoon



SYLLABUS

CRN # 72871

LEVEL 1 & LEVEL 2 SMOG INSPECTOR TRAINING
Room AT1
8/21/17–10/12/17

INSTRUCTOR: JUSTIN FLINT

ROOM/LAB/OFFICE-AT1/AT1/IT202 – Respectively

INSTRUCTIONAL HOURS: Tuesday & Thursday 1:00pm-4:00pm

OFFICE HOURS: Monday – Thursday, 11:00am – 12:15pm (appointment suggested)

PHONE: 661-395-4384 (if no answer, leave a message, expect up to a 24hr response time)

E-MAIL: justin.flint@bakersfieldcollege.edu

COURSE DESCRIPTION:

Auto B39 is a lecture and demonstration course designed to equip students with the knowledge, skills, and abilities needed to perform Smog Check inspections. Students who successfully complete this training will have met the BAR training requirements to qualify to take the Smog Check Inspector state licensing examination. The course is 4 units and will meet for three hours per class period four days a week from 1:00-4:00 pm. The course is divided in to two sections Level 1 (L1) Engine and Emission Control training and Level 2 (L2) Smog Check Training. There will be a separate final exam for both Level 1 and Level 2. Student must fulfill all the BAR specified lab requirements and pass all examinations in order to be eligible to take the Smog Inspector state licensing examination. **Note: It is possible to pass the course at Bakersfield College and not be eligible to take the licensing examination.**

The Level 1 (L1) Engine and Emission Control training is intended to provide students with fundamental knowledge of engine and emission control theory, design, and operation. Students who successfully complete this training will have met the first step of the Bureau of Automotive Repair's (BAR) training requirements for inexperienced or minimally experienced candidates for the Smog Check Inspectors license.

BC STUDENT LEARNING OUTCOMES:

There are 3 selected student leaning outcomes for the B39 course. As a result of participating in the B39 course students will be able to:

1. Evaluate the condition of a vehicle's fuel and emission components by performing Smog Check visual inspections according to the BAR requirements and procedures.
2. Perform smog check functional tests and compare the results to manufacture's specifications and/or BAR requirements.
3. Set up a vehicle and perform Smog Check emission test.

BAR LEVEL 1 STUDENT LEARNING OUTCOMES:

Upon successful completion of this training, students shall, at a minimum, be able to:

1. Describe and demonstrate personal, shop, equipment, and vehicle safety practices.
2. Describe engine theory, design, and operation for both gasoline and diesel vehicles.
3. Demonstrate their knowledge, skills and abilities in identifying engine systems, parts and components.
4. Describe emission control systems theory, design and operation for both gasoline and diesel vehicles.
5. Demonstrate their knowledge, skills and abilities in identifying emission control systems on various vehicle designs.
6. Demonstrate their knowledge, skills and abilities in checking ignition timing on various vehicle designs.
7. Demonstrate their knowledge, skills and abilities in checking the operation of exhaust gas recirculation systems on various system designs.

8. Demonstrate their knowledge, skills and abilities in checking monitor readiness on vehicles equipped with second generation on-board diagnostics systems (OBDII).

*Experienced candidates may skip Level 1 training if they: Possess ASE A6, A8 and L1 certification; or possess an AA/AS degree or Certificate in automotive technology and have 1 year experience; or have 2 years experience and have completed BAR specified diagnostic and repair training.

The Level 2 (L2) Smog Check Training is intended to provide students with the knowledge, skills, and abilities needed to perform Smog Check inspections. Students who successfully complete this training will have met the BAR training requirements to qualify to take the Smog Check Inspector state licensing examination. Prior to enrolling in this course candidates must have passed the L1 training or met the other BAR specified criteria.

BAR LEVEL 2 STUDENT LEARNING OUTCOMES:

Upon successful completion of this training, students shall, at a minimum, be able to:

1. Describe and demonstrate personal, shop, equipment, and vehicle safety practices.
2. Describe the laws, regulations, and procedures associated with consumer authorization of inspections and the overall administration of the Smog Check Program.
3. Describe the standards of practice expected of Smog Check Inspectors.
4. Demonstrate ability to calibrate an emission inspection system.
5. Demonstrate their knowledge, skills and abilities in performing Smog Check emission tests on various vehicle designs.
6. Demonstrate their knowledge, skills and abilities in performing Smog Check visual inspections on various vehicle designs.
7. Describe and demonstrate they have the knowledge, skills and abilities to perform smog check functional tests on various vehicle designs

This course will duplicate as closely as possible a trade experience so the student will be better prepared for obtaining employment as a technician. For this reason, we will be treating the classroom and lab as a workplace environment. Therefore, students will be required to maintain certain standards of performance and responsibility as well as follow shop policies similar to those they will encounter in the workplace.

REQUIRED MATERIALS:

1. Computer and Internet Access
2. Scantron forms: Form #882-E. Packets of 6 are available in the college book store.
3. Three ring binder to hold handouts and notes
4. Safety glasses (if you wear glasses use full cover goggle type or provide instructor proof of polycarbonate safety lenses). Safety glasses must meet ANSI Z87.1 Standards; this number will be stamped on and industry approved safety glasses. NO SAFETY GLASSES – NO LAB
5. Ear protection (ear plugs or ear muffs) must be worn when working near equipment producing high noise levels. It is your responsibility to ensure that you have proper ear protection before starting a project.

TENTATIVE COURSE SCHEDULE:

It is in the best interest of the student to keep up with all assigned reading so that he/she will be prepared to engage in class discussions. I encourage students to ask any questions about the reading material. The **reading assignments and the accompanying homework assignments** will follow the order in the course outline. The Homework assignments and important Exam dates are in **BOLD** print on the course outline. No late work is allowed. **In order to be eligible for the L1 and L2 certificates you must complete all homework assignments. They are required by BAR.** It is my habit to give a quiz at the beginning of class on Mondays to check the comprehension of the material that was covered the week before. Please come prepared (you do not need a scantron for these quizzes).

We will proceed through these topics at a pace based on the students' comprehension of the subject matter. Necessary adjustments may be made to the content and the schedule to ensure the students receive the most thorough education possible

<u>Level 1 Weekly Topics</u>	<u>Tentative Due Date</u>
8/21	Introduction, Syllabus, Overview of Smog Program, SP2
	Syllabus Homework 8-22-17
	SP2 Homework 8-28-17
	Safety Policy Agreement Form 8-28-17
8/22	Engines and Cooling Systems Lecture
	Cause and Effect Homework 8-28-17
8/23-28	Ohms Law, Meters, Wiring Diagrams, Service Information
	Wiring Diagram Homework 8-29-17
8/29-30	Ignition System Lecture
	Module 5 BAR Online Training 8-30-17
8/31-9/5	Carburation, Fuel Systems, and Electronic Fuel Injection
9/6	Onboard Diagnostics and Computer Controls
	OBD Monitors Homework 9-7-17

9/7	OBD Scan Tools and Communication Tests	
9/11	Emission Systems Operation and ID Emission Homework	9-12-17
9/12	EGR Functional Tests	
9/20	Level 1 Final Exam	9-20-17
	Level 1 Final Exam Second Chance	9-21-17
<u>Level 2 Weekly Topics</u>		<u>Tentative Due Date</u>
9/20	Write it Right Booklet Lecture Write it Right Homework	9-25-17
9/21-25	Smog Check Reference Guide Aftermarket parts Homework	9-28-17
9/26-28	Smog Check Procedures Manual Vehicle ID Homework	10-2-17
10/2	OBD Inspection System (OIS) Online training Homework	10-9-17
10/11	Smog License Application Process	
10/12/17	Level 2 Final Exam Attempt 1	10-12-17
10/13/17	Level 2 Final Exam Attempt 2	10-13-17

GRADING POLICY:

There is no grade of incomplete in this class. If you decide to drop this course be sure to make it official by notifying the Bakersfield College records office to prevent receiving an “F” grade for the semester. It is your responsibility to officially drop a class not the instructor’s. **If you choose to withdraw from this course you must do so by 9-21-17 in order to avoid receiving a grade for the course.**

TYPE OF ASSIGNMENT	PERCENTAGE OF GRADE
Homework and Quizzes	20%
LAB ASSIGNMENTS AND TASK SHEETS	40%
L1 FINAL EXAM	20%
L2 FINAL EXAM	20%

Letter grade percentages.

A	90% -100%	EXCELLENCE
B	80% - 89.9%	GOOD
C	70% - 79.9%	AVERAGE
D	60% - 69.9%	BELOW AVERAGE
F	0% - 59.9%	FAILED

ASSISTANCE:

If at any time you are having trouble succeeding in this course, whether because of a change in your life circumstances or because of something you don't understand about the material- please see me. I would be happy to assist you in any way that I can. There are a number of services available to assist Bakersfield College students to succeed in their coursework. The link below will take you to the student resources page for Bakersfield College. I would strongly recommend that you explore the many assistance options that you have.

<https://www.bakersfieldcollege.edu/student>

Note: If you had an IEP or 504 from High School it will not follow you to BC. Please contact DSPS, see above contact info, to get evaluated and bring me your accommodations checklist.

ACCOMIDATIONS FOR STUDENTS WITH DISABILITIES:

Students with disabilities who believe they may need accommodations in this class are encouraged to contact Disabled Student Programs & Services located at Student Services Building, 1st Floor, Counseling Center (661-395-4334), as soon as possible to better ensure such accommodations are implemented in a timely fashion.

ATTENDANCE:

Bakersfield College Automotive Department attendance policy is that any student who has not completed all required safety training, including SP2, before the first census date will be dropped. All students are required to complete their safety training by **August 29th**. In addition to that, if while working in the lab you do not take safety policies seriously and you become a hazard to yourself or others you will be removed from class.

The Bakersfield College Attendance Policy states that “instructors may drop a student from a course when absences number the **equivalent of two weeks** of class recorded from the first day of instruction.” For the purposes of this class any **students absent 4 or more days during the semester will be dropped and 3 tardies will equal one absence**. Attendance will be taken at the beginning of class each day and possibly again during class. A sign in sheet will be available for students arriving late to class for the first **15 minutes** of class. Anyone entering class after that time will not get credit for being in class that day and an absence will be recorded.

In the case of distance learning, “absences” shall be defined as “non-participation.” Instructors may drop students after the equivalent of two weeks of non-participation from the first day of class. Non-participation shall be defined as, but not limited to:

- Not following the instructor’s participation guidelines as stated in the syllabus
- Not submitting required assignments
- Not contributing meaningful discussion in required chat rooms, discussion boards, or other online forums
- Not participating in scheduled activities
- Failure to communicate with the instructor as required

More information on attendance is outlined at
www.bakersfieldcollege.edu/academics/policies.

It is strongly recommended that you read and abide by these standards.

LAB WORK:

Lab packets for Level 1 and Level 2 training will be provided to each student. Shop vehicles will be made available for students to work on and complete lab assignments. Students can bring their own vehicles in for lab but all work brought into the lab must first be cleared with the instructor and have a completed work order on file. All vehicles brought into the lab must have current vehicle registration and insurance. Students are responsible for all projects they bring into class both physically and monetarily.

Note: Any student outside of the classroom or lab during class hours will be considered "cutting class" and an absence will be recorded for the day.

LIABILITY:

Bakersfield College, the Kern Community College District or the instructor will not be responsible for any loss or damage due to theft or fire. Only students currently enrolled in the class are permitted to work in Bakersfield College labs.

STUDENT PARKING:

Students may only park in the vicinity of the Automotive Technology buildings for loading or unloading of parts or for an instructor approved repair pertaining to the class. The speed limit in the Automotive Technology yard is 5mph and will be strictly enforced.

VISITORS:

No visitors are allowed in the lab at any time for safety reasons. Students wishing to speak with visitors should do so before class, after class or during break time. If there is an emergency, make special arrangements with the instructor.

TOOLS:

Students are encouraged to begin building their own tool sets; however, Bakersfield College does provide a set of lab tools. The tools provided by Bakersfield College are for lab use only and should never be removed from the lab. If tools are lost, the instructor may assess the students in the class at the time of loss and appropriate action will be taken in proportion to the tools that are lost.

CELL PHONES:

All cell phones and any other electronic device (iPods, Computers etc...) will be turned off during class and lab. Students using any of these devices during class will be asked to leave class for the rest of the day and an absence will be recorded for that student on the daily roll sheet. If your cell phone rings you during class then you will be given **one warning only** for the semester. If you exceed your one allotted warning you will be asked to leave the class for the

day and an absence will be recorded. If there is an emergency and you are waiting on an important phone call, make special arrangements with the instructor before class.

SMOKING:

No smoking is permitted inside any lab or classroom in accordance with local fire regulations. No smoking or tobacco chewing is allowed inside the lab or fenced yard.

EATING AND DRINKING:

No food or drinks are permitted in the lab at any time. Drinks and light snacks will be permitted in the classroom until an issue occurs. Bottled water is allowed in the lab if empty bottles are disposed of properly. Do not try to bring your “fast food” or the like to class it will not be allowed.

PROHIBITED SUBSTANCES:

Students are prohibited from possession or use of any illegal drugs or firearms. Students are prohibited from possession or use of any alcoholic beverage before class, during class or at break. **Any suspected violation will result in a call to campus security and/or the Bakersfield Police Department and the student will be sent to the dean of students for appropriate action.**

Bakersfield College Automotive Department Professional Conduct Standards

To maintain an efficient learning environment as well as represent the Automotive Department and themselves well, students are expected to conduct themselves in a manner that is required in a professional automotive workplace. These standards are outlined below.

Personal Standards

Automotive students are expected to:

1. Dress appropriately and maintain a professional level of general appearance always.
 - I. Clean, well-kept clothing.
 - II. No clothing that depicts or conveys lewdness or obscenity.
 - III. Pants are to be clean and without holes of any kind. Dickies pants (black or blue) blue jeans and work pants are preferred. Pants are to be worn at the waistline and supported with a belt. **Sagging pants are not allowed.**
 - IV. Students are encouraged to wear black or brown leather work shoes/ boots of a traditional style with oil-resistant soles.
2. Maintain professional level of personal hygiene always. Specifically, but not limited to:
 - Showered daily and removing body odor.
 - Teeth cleaned and breath maintained in a manner that other can speak to you without having to smell offensive odors.
3. Maintain a haircut and facial hair that complies with professional and safety standards.
4. Use language and manners suitable for the workplace always.

5. Meet and maintain employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc.
6. Demonstrate honesty, integrity and reliability.
7. Report to work daily on time; able to take directions and be motivated to accomplish the task at hand.

Workplace Conduct & Ethics

Automotive students are expected to:

1. Comply with workplace policies and laws.
2. Contribute to the success of the team, assists others and requests help when needed.
3. Work well with all customers and coworkers.
4. Negotiate solutions to interpersonal and workplace conflicts.
5. Contribute ideas and initiative.
6. Follow directions.
7. Communicate (written and verbal) effectively with customers and coworkers.
8. Read and interpret workplace documents; write clearly and concisely.
9. Analyze and resolve problems that arise in completing assigned tasks.
10. Organize and implement a productive plan of work.
11. Use scientific, technical, engineering and mathematics principles and reasoning to accomplish assigned tasks.
12. Identify and addresses the needs of all customers, providing helpful, courteous and knowledgeable service and advice as needed.

More information on student conduct is outlined at
www.bakersfieldcollege.edu/studentconduct/code.

It is strongly recommended that you read and abide by these standards

Syllabus Homework
*****Due Next Class Period*****

Full Name _____

Briefly describe your automotive experience.

What automotive system(s) are you most interested in?

What do you expect to gain from this course?

I have read, and reviewed, and answered the questions above to the best of my ability without providing sensitive or confidential information in any way, and I understand and agree to the syllabus. I have signed and provided Mr. Flint with the above completed acknowledgement and acceptance of this syllabus.

Signature: _____ Date: _____

BAR Required Information (print clearly)

e-mail address _____

Date of Birth _____

First Name _____ Last Name _____

Curriculum and Course Updates

KERN COMMUNITY COLLEGE DISTRICT – BAKERSFIELD COLLEGE

AUTO B30 COURSE OUTLINE OF RECORD

1. **DISCIPLINE AND COURSE NUMBER:** AUTO B30
2. **COURSE TITLE:** Electrical and Electronic Systems
3. **SHORT BANWEB TITLE:**
4. **COURSE AUTHOR:** Flint, Justin
5. **COURSE SEATS:** -
6. **COURSE TERMS:** 70 = Fall; 30 = Spring; 50 = Summer
7. **CROSS-LISTED COURSES:**
8. **PROPOSAL TYPE:** BC New Course
9. **START TERM:** 50 = Summer, 2017
10. **C-ID:**
11. **CATALOG COURSE DESCRIPTION:**

This is an introductory electrical course that provides students with theory, knowledge, and skills necessary to understand electrical flow and electronic concepts. Instruction is given and lab experience provided which will enable students to successfully perform diagnostics and repair on basic electrical and electronic circuits found in automotive, agricultural and industrial applications. Demonstrated lecture, simulated problem diagnosis and practical application on "live" vehicles will be used. Preparation for the ASE A6 and California State Lamp Adjuster examination will be covered.

12. GRADING METHOD

Default: S = Standard Letter Grade

Optional:

13. **TOTAL UNITS:** 4

14. INSTRUCTIONAL METHODS / UNITS & HOURS:

<u>Method</u>	<u>Min Units</u>	<u>Min Hours</u>
Lecture	3	54
Lab	1	54
Activity	0	0
Open Entry/Open Exit	0	0
Volunteer Work Experience	0	0
Paid Work Experience	0	0
Non Standard	0	0

Non-Standard Hours Justification:

15. REPEATABILITY**Type:** Non-Repeatable Credit**16. MATERIALS FEE:** No**17. CREDIT BY EXAM:** No**18. CORE MISSION APPLICABILITY:** Associate Degree Applicable (AA/AS);Certificate of Achievement (COA);Career Technical Education (CTE)**19. STAND-ALONE:** No**20. PROGRAM APPLICABILITY**

Required: Automatic Transmissions (Certificate of Achievement)
 Automotive Heating and Air Conditioning (Certificate of Achievement)
 Automotive Technology (AS Degree Program)
 Brake Systems (Certificate of Achievement)
 Electrical and Electronic Systems (Certificate of Achievement)
 Engine Performance (Certificate of Achievement)
 Light Duty Diesel Performance (Certificate of Achievement)
 Manual Drive Train and Axles (Certificate of Achievement)
 Suspension and Steering (Certificate of Achievement)

Restricted Elective:**Elective:****21. GENERAL EDUCATION APPLICABILITY****Local:****IGETC:****CSU:****UC Transfer Course:****CSU Transfer Course:****22. STUDENT LEARNING OUTCOMES Upon completion of the course, the student will be able to**

1. evaluate the integrity of electrical and electronic circuits using wiring diagrams and the principles of Ohm's Law.
2. assemble basic electrical circuits, perform electrical measurements with Industry recognized tools and procedures.
3. analyze battery, starting and charging system faults and be able to formulate a diagnostic strategy.
4. COURSE OBJECTIVES a) Students will learn the meaning and application of Ohms Law b) Students will understand how to read wiring diagrams c) Students will learn how to read and use a voltmeter d) Students will learn testing strategies for electrical circuit faults e) Students will learn the laws for aiming and adjusting headlights

23. REQUISITES

Prerequisite:

AUTO B11
with a grade of "C" or better.
Content Review/Content Review + Statistics

24. DETAILED TOPICAL OUTLINE:

Lecture:

Lecture Outline

We will proceed through these topics at a pace based on the students' comprehension of the subject matter. There will be lab tasks assigned throughout the semester to compliment lecture topics. Necessary adjustments will be made to the content and schedule to ensure the students receive the most thorough education possible.

- A. General Electrical System theory and concepts. (3 weeks)
 - 1. Electrical basics: Electron theory ohm's law magnetic induction concepts.
 - 2. Wiring diagrams and Electrical circuits.
 - 3. Voltages and voltage drops in electrical/electronic circuits.
 - 4. Current flow in electrical/electronic circuits and components.
 - 5. Shorts grounds opens and high resistance problems in electrical/electronic.
 - 6. Parasitic current draw.
 - 7. Circuit protective devices.
 - 8. Circuit components: Switches connectors insulators conductors.
 - 9. Units of measure and conversion processes used in electricity and electronics.
- B. Battery theory and science (2 weeks)
 - 1. Battery state-of-charge.
 - 2. Battery capacity (load high-rate discharge).
 - 3. Electronic memory concepts.
 - 4. Slow/ vs. fast battery charge concepts.
 - 5. Battery cables connectors clamps and hold-downs.
 - 6. Theory and accepted practices of applying auxiliary vehicle electrical power sources.
- C. Starting System (2 weeks)
 - 1. Concepts of magnetism induction and torque.
 - 2. Starter current draw and circuit voltage drop.
 - 3. Relays solenoids and magnetic induction theory.
- D. Charging System concepts and theory of operation. (2 weeks)
 - 1. Electro-mechanical theory and concepts.
 - 2. AC / DC theory and diode rectification concepts.
 - 3. Concepts and analysis of undercharge no-charge or an overcharge condition.
 - 4. Voltage regulation.
- E. Lighting Systems power flow concepts (3 weeks)
 - 1. Headlights taillights and stoplights.
 - 2. Clearance and auxiliary lighting.
 - 3. Turn signal or hazard light operation.
 - 4. Module control of daytime running lights.
 - 5. Voltage drop and lighting systems functionality.
 - 6. Lamp adjustor laws and regulations
 - i. Lamp adjustment procedures
- F. Horn and Wiper/Washer. (2 weeks)
 - 1. Circuitry layout and structure.
 - 2. Electrical concepts and theories associated with these circuits.
- G. Accessories analysis and diagnosticsn (1 week)
 - 1. Slow intermittent or no operation of motor-driven accessory circuits.
 - 2. Poor intermittent or no electric door and hatch/trunk lock operation.

3. Unregulated intermittent or no operation of cruise control systems.
4. Supplemental restraint system warning light staying on or flashing. Safety procedures to prevent accidental deployment.

Lab:

NATEF TASKS BASIC ELECTRICAL

After each section is discussed in lecture students will have an associated lab where they will be given the opportunity to practice diagnostic strategies and techniques associated with different vehicle systems.

A. General: Electrical System Diagnosis (3 weeks)

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
3. Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop (including grounds), current flow and resistance.
4. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
5. Check operation of electrical circuits with a test light.
6. Check operation of electrical circuits with fused jumper wires.
7. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems.
9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.
10. Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action.
11. Replace electrical connectors and terminal ends.
12. Repair wiring harness.
13. Perform solder repair of electrical wiring.

B. Battery Diagnosis and Service (2 weeks)

1. Perform battery state-of-charge test; determine necessary action.
2. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.
3. Maintain or restore electronic memory functions.
4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
5. Perform slow/fast battery charge according to manufacturer's recommendations.
6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.
8. Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.

C. Starting System Diagnosis and Repair (2 weeks)

1. Perform starter current draw tests; determine necessary action.

2. Perform starter circuit voltage drop tests; determine necessary action.
3. Inspect and test starter relays and solenoids; determine necessary action.
4. Remove and install starter in a vehicle.
5. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.
6. Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition.

D. Charging System Diagnosis and Repair (2 weeks)

1. Perform charging system output test; determine necessary action.
2. Diagnose (troubleshoot) charging system for causes of undercharge, no-charge, or overcharge conditions.
3. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.
4. Remove, inspect, and re-install generator (alternator).
5. Perform charging circuit voltage drop tests; determine necessary action.

E. Lighting Systems Diagnosis and Repair (3 weeks)

1. Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine necessary action.
2. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.
3. Aim headlights.
4. Identify system voltage and safety precautions associated with high-intensity discharge headlights.

G. Horn and Wiper/Washer Diagnosis and Repair (2 weeks)

1. Diagnose (troubleshoot) causes of incorrect horn operation; perform necessary action.
2. Diagnose (troubleshoot) causes of incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.
3. Diagnose (troubleshoot) windshield washer problems; perform necessary action.

H. Accessories Diagnosis and Repair (1 weeks)

10. Verify windshield wiper and washer operation, replace wiper blades.

25. **METHODS OF INSTRUCTION--Course instructional methods may include but are not limited to**

1. Audiovisual;
2. Case Study;
3. Computational Work;
4. Demonstration;
5. Discussion;
6. Group Work;
7. Guest Lecturers;
8. In-class writing;

9. Instruction through examination or quizzing;
10. Laboratory;
11. Lecture;
12. Outside reading;
13. Peer analysis, critique & feedback;
14. Peer-to-peer instruction;
15. Performance;
16. Problem Solving;
17. Project-based learning;
18. Skills Development and Performance;
19. Written work;

26. **OUT OF CLASS ASSIGNMENTS: Out of class assignments may include but are not limited to**

Out of class assignments may include but are not limited to bookwork and associate chapter homework, online supplemental instruction through Moodle, research based homework assignments on industry websites or factory information sources.

27. **METHODS OF EVALUATION: Assessment of student performance may include but is not limited to**

Chapter Tests - A.S.E. certification exam format.

Written Assignments

Small group and individual lab tasks

Final Exam - A.S.E. certification exam format and practical (hands-on) tasks.

28. **TEXTS, READINGS, AND MATERIALS: Instructional materials may include but are not limited to**

Textbooks Halderman, J. D.. (2016) *Automotive Technology: Principles, Diagnosis, and Service*, 5th, Prentice Hall

Manuals

Periodicals

Software

Other

29. **METHOD OF DELIVERY:** Face to face;

30. **MINIMUM QUALIFICATIONS:** Automotive Technology;

31. **APPROVALS:**

Origination Date 07/30/2015

Last Outline Revision
09/01/2016

**Curriculum
Committee
Approval**
09/15/2016

Board of Trustees
11/10/2016

State Approval

UC Approval
**UC Approval
Status**

CSU Approval
**CSU Approval
Status**

IGETC Approval
**IGETC Approval
Status**

CSU GE Approval
**CSU GE Approval
Status**

Data Element Changes

Data Justification

This course was designed to be able to articulate with other schools. In the past, two disciplines were taught within an 11 unit course listed as B14. We have developed two lower unit courses, B30 and B31, to replace the large 11 unit B14 course. If a student takes B30 and B31 this should be considered equivalent to taking B14. The lower unit focused topic course will be eligible to transfer to UC and CSU schools. Lower unit courses will also allow for growth in our automotive program enabling multiple sections to be taught as needed and will also allow us to have opportunity to grow our adjunct pool of instructors.

Course Element Changes

Course Change Justification

**Course ID
(CB00)** CCC000578359

**TOP Code
(CB03)** 0948.00 - Automotive Technology*;

**Course Credit
Status (CB04)** D - Credit - Degree Applicable;

**Course Transfer
Status (CB05)** C = Not Transferable

**Course Units of
Credit
Maximum High
(CB06):** 4

Course Units of Credit Minimum Low (CB07): 4

Course Basic Skills (BS) Status (CB08): N = Course is not a basic skills course.

SAM Code (CB09): C = Occupational;

Cooperative Education Course Status (CB10): Not part of Coop Work Exp;

Course Classification Code (CB11): Not Applicable, Credit Course;

Course Special Status (CB13): N - Not Special;

CAN Code (CB14):

CAN-Code Seq (CB15):

Course Prior to College Level (CB21): Not Applicable;

Course Non-Credit Category (CB22): Not Applicable, Credit Course;

Funding Agency Category (CB23): Not Applicable

Course Program Status (CB24): 1 - Program Applicable;

KERN COMMUNITY COLLEGE DISTRICT – BAKERSFIELD COLLEGE

AUTO B31 COURSE OUTLINE OF RECORD

1. **DISCIPLINE AND COURSE NUMBER:** AUTO B31
2. **COURSE TITLE:** Advanced Electrical and Electronic Systems
3. **SHORT BANWEB TITLE:**
4. **COURSE AUTHOR:** Flint, Justin
5. **COURSE SEATS:** -
6. **COURSE TERMS:** 30 = Spring; 50 = Summer; 70 = Fall
7. **CROSS-LISTED COURSES:**
8. **PROPOSAL TYPE:** BC New Course
9. **START TERM:** 50 = Summer, 2017
10. **C-ID:**
11. **CATALOG COURSE DESCRIPTION:** This is an advanced course that provides students with theory, knowledge, and skills necessary to understand advanced automotive electronic diagnostic and repair concepts. Instruction is given and lab experience provided which will enable students to successfully perform diagnostics, pinpoint tests, and employ advanced circuit test strategies on electrical and electronic circuits. Demonstrated lecture, simulated problem diagnosis and practical application on "live" vehicles will be used. The course prepares students for the A-6 and L3 ASE exams.

12. GRADING METHOD

Default: S = Standard Letter Grade

Optional:

13. **TOTAL UNITS:** 5

14. INSTRUCTIONAL METHODS / UNITS & HOURS:

<u>Method</u>	<u>Min Units</u>	<u>Min Hours</u>
Lecture	4	72
Lab	1	54
Activity	0	0
Open Entry/Open Exit	0	0
Volunteer Work Experience	0	0
Paid Work Experience	0	0
Non Standard	0	0

Non-Standard Hours Justification:

15. REPEATABILITY

Type: Non-Repeatable Credit

16. **MATERIALS FEE:** No
17. **CREDIT BY EXAM:** No
18. **CORE MISSION APPLICABILITY:** Associate Degree Applicable (AA/AS);Certificate of Achievement (COA);Career Technical Education (CTE)
19. **STAND-ALONE:** No

20. **PROGRAM APPLICABILITY**

Required: Electrical and Electronic Systems (Certificate of Achievement)

Restricted Elective:

Elective: Automotive Technology (AS Degree Program)

21. **GENERAL EDUCATION APPLICABILITY**

Local:

IGETC:

CSU:

UC Transfer Course:

CSU Transfer Course:

22. **STUDENT LEARNING OUTCOMES Upon completion of the course, the student will be able to**

1. evaluate the calibration of a vehicle's computer modules
2. analyze data from computer modules and formulate a diagnostic pathway in solving automotive repair problems.
3. analyze computer networking faults and be able to formulate a diagnostic strategy
4. COURSE OBJECTIVES a) Students will learn how to read and use a Digital Storage Oscilloscope b) Students will learn the theory of operation and test strategy for various types of sensors and computer controlled systems. c) Students will learn test strategy and appropriate safety precautions when working with high voltage circuits on hybrid vehicles. d) Students will practice flash programming vehicles.

23. **REQUISITES**

Prerequisite:

AUTO B30
with a grade of "C" or better.
Content Review/Content Review + Statistics

24. **DETAILED TOPICAL OUTLINE:**

Lecture:

Lecture Outline

We will proceed through these topics at a pace based on the students' comprehension of the subject matter. There will be lab tasks assigned throughout the semester to compliment lecture topics.

Necessary adjustments will be made to the content and schedule to ensure the students receive the most thorough education possible.

- A. Review of electrical fundamentals and basic test equipment (.5 weeks)
 - 1. Current flow in electrical circuits
 - 2. AC vs. DC voltage concepts
 - 3. Insulators vs. conductors
 - 4. Ohm's law to figure voltage current and resistance values.
 - 5. Voltage values and voltage drop concepts
 - 6. Circuit protection: Fusible links circuit breakers and fuses
 - 7. Switches connectors wire types and sizes
 - 8. Electrical sensors
 - 9. Electrical malfunctions: Shorts grounds opens and high resistance issues
 - 10. Key-off battery parasitic drain
 - 11. Diagnosis of electrical circuits using fused jumper wires
 - 12. Voltmeters Ammeters Ohmmeters
 - 13. Test lights multimeters logic probes

- B. Electrical circuit analysis (.5 weeks)
 - 1. Series circuits
 - 2. Parallel circuits
 - 3. Series-parallel circuits
 - 4. Circuits that perform work
 - 5. Control circuits
 - 6. Circuit diagnostics

- C. Advanced electronics fundamentals (2 weeks)
 - 1. Analog vs. digital circuits
 - 2. Concepts of Kirchhoff's law
 - 3. Solid state principles

- D. Electronic control devices: (2 weeks)
 - 1. Electronic Control Units (ECU)
 - 2. Body Control Modules (BCM)
 - 3. Inputs vs. outputs
 - 4. Actuators

- E. Advanced circuitry: Concepts and principles (2 weeks)
 - 1. Integrated circuits
 - 2. Multiplex circuits
 - 3. Controller Area Network (CAN) concepts
 - 4. Local Area Network (LAN) circuits
 - 5. Binary Unit System (BUS) concepts
 - 6. Other advanced on-board circuits
 - a. Supplemental Restraint System (SRS)
 - b. Timer-controlled circuits
 - c. Duty cycle and pulse width

- F. Driver Information Systems theory and operation (2 weeks)
 - 1. Concepts and causes of intermittent high low or no gauge readings.
 - 2. Circuit voltage regulators (limiters).
 - 3. Gauges and gauge sending units.
 - 4. Printed circuit board concepts.
 - 5. Constant intermittent or no warning light and driver information system operation.
 - 6. Intermittent high low or no readings on electronic digital instrument clusters.
 - 7. Sensors sending units connectors and wires of electronic digital instrument circuits.

- G. Hybrid Technology (2 weeks)
 - 1. Basic layout and concepts
 - 2. battery system
 - 3. internal combustion engine (ICE)
 - 4. drive system
 - 5. power electronics
 - 6. Hybrid supporting systems.
 - 7. Diagnostic strategies and pinpoint tests

- H. Advanced diagnostic equipment: (2 weeks)
 - 1. The Digital Storage Oscilloscope (DSO)
 - a. DSO slope switch and trigger
 - b. Reading and interpreting a DSO pattern
 - c. Pulsing DC voltage signal and frequency
 - d. Using a current probe with a DSO
 - e. Analyzing the DSO multiple-trace function
 - 2. Scan tools: Factory and aftermarket
- I. Reprogramming, Reflashing, and Coding modules (2 weeks)
 - 1. Introduction and vocabulary
 - 2. Applications and procedures

Lab:

NATEF TASKS ADVANCED ELECTRICAL

After each section is discussed in lecture students will have an associated lab where they will be given the opportunity to practice diagnostic strategies and techniques associated with different vehicle systems.

A. General: Electrical System Diagnosis (3 weeks)

- 8. Diagnose the cause(s) of excessive key-off battery drain (parasitic draw); determine necessary action.
- 14. Check electrical/electronic circuit waveforms; interpret readings and determine needed repairs.
- 15. Repair CAN/BUS wiring harness.

B. Battery Diagnosis and Service (2 weeks)

- 7. Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions.
- 9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

C. Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair (4 weeks)

- 1. Inspect and test gauges and gauge sending units for causes of abnormal gauge readings; determine necessary action.
- 2. Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems; determine necessary action.

D. Accessories Diagnosis and Repair (6 weeks)

- 1. Diagnose (troubleshoot) incorrect operation of motor-driven accessory circuits; determine necessary action.
- 2. Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry); determine necessary action.
- 3. Diagnose (troubleshoot) incorrect operation of cruise control systems; determine necessary action.
- 4. Diagnose (troubleshoot) supplemental restraint system (SRS) problems; determine necessary action.
- 5. Disable and enable an airbag system for vehicle service; verify indicator lamp operation.
- 6. Remove and reinstall door panel.
- 7. Check for module communication errors (including CAN/BUS systems) using a scan tool.
- 8. Describe the operation of keyless entry/remote-start systems.
- 9. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.
- 11. Diagnose (troubleshoot) radio static and weak, intermittent, or no radio reception; determine necessary action.

12. Diagnose (troubleshoot) body electronic system circuits using a scan tool; determine necessary action.
13. Diagnose the cause(s) of false, intermittent, or no operation of anti-theft systems.
14. Describe the process for software transfers, software updates, or flash reprogramming on electronic modules.

25. METHODS OF INSTRUCTION--Course instructional methods may include but are not limited to

1. Audiovisual;
2. Case Study;
3. Computational Work;
4. Demonstration;
5. Discussion;
6. Group Work;
7. Guest Lecturers;
8. In-class writing;
9. Instruction through examination or quizzing;
10. Laboratory;
11. Lecture;
12. Outside reading;
13. Peer analysis, critique & feedback;
14. Performance;
15. Problem Solving;
16. Project-based learning;
17. Skills Development and Performance;
18. Written work;

26. OUT OF CLASS ASSIGNMENTS: Out of class assignments may include but are not limited to

Out of class assignments may include but are not limited to bookwork and associate chapter homework, online supplemental instruction through Moodle, research based homework assignments on industry websites or factory information sources.

27. METHODS OF EVALUATION: Assessment of student performance may include but is not limited to

Chapter Tests - A.S.E. certification exam format.

Written Assignments

Small group and individual lab tasks

Final Exam - A.S.E. certification exam format and practical (hands-on) tasks.

28. TEXTS, READINGS, AND MATERIALS: Instructional materials may include but are not limited to

Textbooks

Halderman, J. D.. (2016) *Automotive Technology: Principles, Diagnosis, and Service*, 5th, Prentice Hall

Manuals

Periodicals

Software

Other

29. **METHOD OF DELIVERY:** Face to face;

30. **MINIMUM QUALIFICATIONS:** Automotive Technology;

31. **APPROVALS:**

Origination Date 07/30/2015

Last Outline Revision
09/01/2016

Curriculum Committee Approval
09/15/2016

Board of Trustees
11/10/2016

State Approval

UC Approval
UC Approval Status

CSU Approval
CSU Approval Status

IGETC Approval
IGETC Approval Status

CSU GE Approval
CSU GE Approval Status

Data Element Changes

Data Justification

This course was designed to be able to articulate with other schools. In the past, two disciplines were taught within an 11 unit course listed as B14. We have developed two lower unit courses, B30 and B31, to replace the large 11 unit B14 course. If a student takes B30 and B31 this should be considered equivalent to taking B14. The lower unit focused topic course will be eligible to transfer to UC and CSU schools. Lower unit courses will also allow for growth in our automotive program enabling multiple sections to be taught as needed and will also allow us to have opportunity to grow our adjunct pool of instructors.

Course Element Changes

**Course Change
Justification**

Course ID (CB00) CCC000578358

TOP Code (CB03) 0948.00 - Automotive Technology*;

Course Credit Status (CB04) D - Credit - Degree Applicable;

Course Transfer Status (CB05) C = Not Transferable

Course Units of Credit Maximum High (CB06): 5

Course Units of Credit Minimum Low (CB07): 5

Course Basic Skills (BS) Status (CB08): N = Course is not a basic skills course.

SAM Code (CB09): B = Advance Occupational;

Cooperative Education Course Status (CB10): Not part of Coop Work Exp;

Course Classification Code (CB11): Not Applicable, Credit Course;

Course Special Status (CB13): N - Not Special;

CAN Code (CB14):

CAN-Code Seq (CB15):

Course Prior to College Level (CB21): Not Applicable;

Course Non-Credit Category (CB22): Not Applicable, Credit Course;

Funding Agency Category (CB23): Not Applicable

Course Program Status (CB24): 1 - Program Applicable;

KERN COMMUNITY COLLEGE DISTRICT – BAKERSFIELD COLLEGE

AUTO B39 COURSE OUTLINE OF RECORD

1. **DISCIPLINE AND COURSE NUMBER:** AUTO B39
2. **COURSE TITLE:** Level 1 and Level 2 Smog Inspector Training
3. **SHORT BANWEB TITLE:**
4. **COURSE AUTHOR:** Flint, Justin
5. **COURSE SEATS:** -
6. **COURSE TERMS:** 70 = Fall; 30 = Spring; 50 = Summer
7. **CROSS-LISTED COURSES:**
8. **PROPOSAL TYPE:** BC New Course
9. **START TERM:** 50 = Summer, 2017
10. **C-ID:**
11. **CATALOG COURSE DESCRIPTION:** This is a Bureau of Automotive Repair certified course which includes Level 1 and Level 2 certificate training. The Level 1 (L1) Engine and Emission Control training is intended to provide students with fundamental knowledge of engine and emission control theory, design, and operation. The Level 2 (L2) Smog Check Training is intended to provide students with the knowledge, skills, and abilities needed to perform Smog Check inspections. Students who successfully pass both Level 1 and Level 2 training courses will have met the eligibility requirements to take the Smog Check Inspector State License examination.

12. GRADING METHOD

Default: S = Standard Letter Grade

Optional:

13. **TOTAL UNITS:** 4

14. INSTRUCTIONAL METHODS / UNITS & HOURS:

<u>Method</u>	<u>Min Units</u>	<u>Min Hours</u>
Lecture	3	54
Lab	1	54
Activity	0	0
Open Entry/Open Exit	0	0
Volunteer Work Experience	0	0
Paid Work Experience	0	0
Non Standard	0	0

Non-Standard Hours Justification:

15. REPEATABILITY**Type:** Non-Repeatable Credit**16. MATERIALS FEE:** No**17. CREDIT BY EXAM:** No**18. CORE MISSION APPLICABILITY:** Associate Degree Applicable (AA/AS); Career Technical Education (CTE)**19. STAND-ALONE:** No**20. PROGRAM APPLICABILITY****Required:****Restricted Elective:****Elective:** Automotive Technology (AS Degree Program)**21. GENERAL EDUCATION APPLICABILITY****Local:****IGETC:****CSU:****UC Transfer Course:****CSU Transfer Course:****22. STUDENT LEARNING OUTCOMES Upon completion of the course, the student will be able to**

1. Evaluate the condition of a vehicle's fuel and emission components by performing Smog Check visual inspections according to the BAR requirements and procedures.
2. Perform smog check functional tests and compare the results to manufacture's specifications and/or BAR requirements.
3. Set up a vehicle and perform Smog Check emission test.
4. COURSE OBJECTIVES a) Describe and demonstrate personal, shop, equipment, and vehicle safety practices. b) Describe engine theory, design, and operation for both gasoline and diesel vehicles. c) Demonstrate their knowledge, skills and abilities in identifying engine systems, parts and components. d) Describe emission control systems theory, design and operation for both gasoline and diesel vehicles. e) Demonstrate their knowledge, skills and abilities in identifying emission control systems on various vehicle designs. f) Demonstrate their knowledge, skills and abilities in checking ignition timing on various vehicle designs. g) Demonstrate their knowledge, skills and abilities in checking the operation of exhaust gas recirculation systems on various system designs. h) Demonstrate their knowledge, skills and abilities in checking monitor readiness on vehicles equipped with second generation on-board diagnostics systems (OBDII). i) Describe the laws, regulations, and procedures associated with consumer authorization of inspections and the overall administration of the Smog Check Program. j) Describe the standards of practice expected of Smog Check Inspectors. k) Demonstrate ability to calibrate an emission inspection system.

23. **REQUISITES**

Prerequisite:

AUTO B10
Content Review/Content Review + Statistics

24. **DETAILED TOPICAL OUTLINE:**

Lecture:

We will proceed through these topics at a pace based on the students' comprehension of the subject matter. There will be lab tasks assigned throughout the semester to compliment lecture topics. Necessary adjustments will be made to the content and schedule to ensure the students receive the most thorough education possible.

LEVEL 1 LECTURE TOPICS

A. Safety (1 week)

1. Describe and demonstrate knowledge and application of proper safety practices (personal, shop, tool, equipment, environmental, and vehicle).

B. Engine Theory, Design and Operation (Gasoline / Diesel) (1 week)

1. Describe basic knowledge of four stroke operation.
2. Describe basic knowledge of spark ignited combustion.
3. Describe knowledge of how poor engine condition can affect emissions output.
4. Identify and locate primary engine systems and components.

C. Cooling System (1 week)

1. Describe basic knowledge of cooling system design and operation as applicable to safety and understanding normal operating temperature.
2. Describe how a poor performing cooling system can affect emissions output.

D. Exhaust System (1 week)

1. Identify exhaust system components and distinguish between single and dual exhaust systems.

E. Electrical (1 week)

1. Describe and demonstrate knowledge of basic electrical principals-to the extent necessary to conduct Smog Check functional tests, including EGR (battery polarity, shorts, opens, grounds, etc.).
2. Use electrical component locator- examples: OBDII DLC, EGR solenoid.

F. Ignition System (1 week)

1. Describe knowledge of ignition systems theory, design and operation.
2. Identify and locate ignition system types and components (primary and secondary ignition).
3. Describe knowledge of how a malfunctioning ignition system can increase emissions output.

G. Induction System (1 week)

1. Identify and locate air induction and air cleaner assemblies and components.
2. Identify and locate the intake manifold.
3. Describe and locate positive pressure induction systems (turbo charger and components, supercharger and components).
4. As related to Smog Check functional tests, describe and measure manifold pressure.
5. As related to Smog Check functional tests, identify and locate the source and measure ported and venturi vacuum.

H. Fuel Injection (1 week)

1. Describe basic knowledge of fuel injection systems theory, design and operation.

2. Describe knowledge of how a malfunctioning fuel injection system can affect emissions output, as related to Smog Check results.
3. Identify and locate fuel injection system types and components on various vehicle designs (CIS, TBI, Multi port, Direct, Other).
4. Identify and locate diesel fuel system components.

I. Carburetion (1 week)

1. Demonstrate basic knowledge of carburetor theory, design and operation, including feedback operation.
2. Demonstrate knowledge of how a malfunctioning carburetor can affect emissions output, as related to smog check emissions results.

J. Engine Management Systems and On-Board Diagnostics (1 week)

1. Demonstrate basic knowledge of engine management systems and on-board diagnostics theory, design and operation.
2. Within the context of the Smog Check visual inspection, identify engine management system components, actuators, sensors and switches -
3. Demonstrate knowledge OBDII monitor enabling criteria, including drive cycle routines.

K. Emission Controls, Theory, Design, and Operation (1 week)

1. Demonstrate basic knowledge of theory, design and operation of the following emission control systems:
 - i. Crankcase Ventilation
 - ii. Evaporative (EVAP)
 - iii. Exhaust Gas Recirculation(EGR)
 - iv. Thermostatic Air Cleaner (TAC)
 - v. Air Injection (AIS)
 - vi. Ignition Spark Controls (SPK)
 - vii. Catalytic Converter (CAT)
 - viii. Diesel Oxidation Catalyst (DOC)
 - ix. Periodic Trap Oxidizer (PTOX)
 - x. Diesel Particulate Trap or Filter (DPF)
 - xi. Diesel Selective Catalyst Reduction (SCR)
2. Emissions Cause and Effect
3. Describe definitions, causes and effects of the following emissions:
 - i. Carbon monoxide (CO)
 - ii. Hydrocarbon (HC)
 - iii. Nitrogen (NO_x)
 - iv. Carbon dioxide

LEVEL 2 LECTURE

A. Administrative (.75 week)

1. Describe expectations of a Smog Check licensee.
2. Describe Smog Check station requirements.
3. Describe Smog Check inspector requirements.
4. Describe Smog Check station operation requirements.
5. Describe the provisions of the Consumer Assistance Program.
6. Describe repair cost waiver requirements.
7. Describe sublet rules related to Smog Check inspection.
8. Identify vehicles subject to Smog Check inspection.

9. Describe directed vehicle requirements.
10. Describe Smog Check services provided by the State Referee.
11. Identify vehicles required to be inspected by the State Referee.
12. Describe the option of a Smog Check pre-inspection.
13. Describe limits of repairs performed during Smog Check inspection.
14. Describe the requirements for documenting a Visible Smoke Test failure.
15. Describe requirements of a Vehicle Inspection Report (VIR).
16. Describe the special circumstances that must be documented on the VIR.

B. Equipment Maintenance (.25week)

1. Describe practices of proper equipment maintenance.
2. Describe the prohibitions of test equipment modifications

C. Visual Inspection (1 week)

1. Describe the general purpose, design and operation of the following emission control systems:
 - i. Crankcase Controls
 - ii. Evaporative (EVAP)
 - iii. Exhaust Gas Recirculation(EGR)
 - iv. Thermostatic Air Cleaner (TAC)
 - v. Air Injection (AIS)
 - vi. Ignition Spark Controls (SPK)
 - vii. Exhaust Gas After-Treatment Systems:
 1. Catalytic Converter (CAT)
 2. Diesel Oxidation Catalyst (DOC)
 3. Periodic Trap Oxidizer (PTOX)
 4. Diesel Particulate Trap or Filter (DPF)
 5. Diesel Selective Catalyst Reduction (SCR)
 - viii. Other Emission Controls
2. Describe the visual inspection pass/fail criteria (OIS and BAR-97).
3. Describe and determine vehicle emissions certification type.
4. Identify and record the required emission controls for at least three different vehicle makes, using ECS guides and emission control labels.
5. Identify exhaust system components and distinguish between single and dual exhaust systems.
6. Demonstrate the knowledge and ability to use electrical wiring diagrams applicable to Smog Check visual inspection.
7. Demonstrate the knowledge and ability to use electrical component locator to find emission control components (OBDII DLC, EGR solenoid, EVAP purge solenoid, etc).
8. Describe the Smog Check inspection requirements for aftermarket parts.
9. Describe California Air Resources Board (CARB) Executive Order label requirements for aftermarket parts, and aftermarket catalytic converters.
10. Demonstrate the ability to check for CARB approval of aftermarket parts.
11. Describe and demonstrate knowledge and ability to perform the Liquid Fuel Leak inspection.
12. Describe and demonstrate knowledge and ability to perform the gasoline vehicle Visible Smoke Test.
13. Describe and demonstrate the knowledge and ability to perform the diesel Visible Smoke Test.
14. Identify and locate gasoline induction and fuel system components.
15. Identify and locate diesel induction and fuel system components.
16. Identify engine management system components, actuators, sensors, and switches.

D. Emissions Tests (1 week)

1. Describe the conditions that must be met before beginning a Smog Check emission test.
2. Describe the automated second chance test for vehicles that fail the two speed idle test.
3. Identify the types of vehicles that are incompatible with the ASM test.
4. Describe the gear selection requirements for the ASM test.
5. Describe emission test abort conditions.
6. Demonstrate knowledge and ability to perform emissions tests.

E. Functional Tests (1 week)

1. Describe OBDII monitor enabling criteria, including the purpose of drive cycles.
2. Identify vehicles subject to the OBDII functional test.
3. Describe Smog Check OBDII monitor readiness requirements.
4. Demonstrate knowledge and ability to locate and connect scan tool or OIS/EIS to the diagnostic link connector (DLC) on at least three different vehicle makes.
5. Describe the processes used to address vehicles with known OBDII test difficulties.
6. Identify the vehicles subject to the malfunction indicator light (MIL) functional test.
7. Describe the difference between a MIL and a maintenance reminder light.
8. Describe and demonstrate knowledge and ability to conduct the MIL functional test on at least three different vehicle makes.
9. Identify the vehicles subject to ignition timing functional test, include exception for non-adjustable timing.
10. Identify the manufacturer ignition timing specifications for at least three different vehicle makes. Use emission control labels, ECS guides or other reliable vehicle references.
11. Describe the engine RPM requirements for the ignition timing functional test.
12. Describe the pass/fail criteria for the ignition timing functional test.
13. Identify vehicles subject to the Exhaust Gas Recirculation (EGR) test.
14. Describe the general design strategies for various EGR systems (conventional, back pressure, electric/electronic controlled and actuated).
15. Describe and demonstrate knowledge and ability to conduct the EGR functional test on at least three different vehicle makes.
16. Identify vehicles subject to the Fuel Cap Integrity Test.
17. Describe and demonstrate the knowledge and ability to conduct the Fuel Cap Integrity Test.
18. Identify vehicles subject to the Low Pressure Fuel Evaporative Test (LPFET).
19. Describe and demonstrate the knowledge and ability to conduct the LPFET functional test on at least three different vehicle makes.
20. Demonstrate knowledge and ability to upload data from the low pressure fuel evaporative tester.

Lab:

After each section is discussed in lecture students will have an associated lab where they will be given the opportunity to practice diagnostic strategies and techniques associated with different vehicle systems.

LEVEL 1 LAB TASKS**A. Engine Theory, Design and Operation (Gasoline / Diesel) (1 week)**

1. Identify and locate primary engine systems and components.
2. Recognize abnormal engine noises and/or vibrations that would cause a safety risk.
3. Inspect and assess condition of drive belts, pulleys, and tensioners (related to item 1 safety).

B. Cooling System (1 week)

1. Identify and locate cooling system components.
2. Check for proper coolant level.
3. Check and identify proper engine operating temperature.

C. Exhaust System (1 week)

1. Identify exhaust system components and distinguish between single and dual exhaust systems.
2. Recognize abnormal exhaust smoke.

D. Electrical (1 week)

1. Describe and demonstrate knowledge of basic electrical principals-to the extent necessary to conduct Smog Check functional tests, including EGR (battery polarity, shorts, opens, grounds, etc.).
2. As applicable to Smog Check inspection, demonstrate use electrical wiring diagrams.
3. Use electrical component locator- examples: OBDII DLC, EGR solenoid.
4. As applicable to EGR functional testing or other Smog Check related testing, demonstrate the proper use of a digital multi-meter.

E. Ignition System (1 week)

1. Identify and locate ignition system types and components (primary and secondary ignition).
2. Check ignition timing and verify proper setting on various vehicle designs. This includes the ability to use references sources to determine proper timing check procedures (under-hood ECS label, emission control application guides, and service/repair manuals).

F. Induction System (1 week)

1. Identify and locate air induction and air cleaner assemblies and components.
2. Identify and locate the intake manifold.
3. Describe and locate positive pressure induction systems (turbo charger and components, supercharger and components).
4. As related to Smog Check functional tests, describe and measure manifold pressure.
5. As related to Smog Check functional tests, identify and locate the source and measure ported and venturi vacuum.

G. Fuel Injection (1 week)

1. Identify and locate fuel injection system types and components on various vehicle designs (CIS, TBI, Multi port, Direct, Other).
2. Identify and locate diesel fuel system components.

H. Carburetion

1. Within the context of a Smog Check visual inspection, identify components of a carburetor, including those that inexperienced students may have difficulty associating with carburetion (early fuel evaporation, anti-“dieseling” controls, deceleration controls, etc.).
2. Check for proper engine idle speed, per manufacturer’s specification.

I. Engine Management Systems and On-Board Diagnostics (1 week)

1. Within the context of the Smog Check visual inspection, identify engine management system components, actuators, sensors and switches -
2. Check for proper OBDII communication.
3. Locate and connect scan tool to diagnostic link connector (DLC) on various vehicle applications.
4. Use a scan tool check OBDII monitor status.

J. Emission Controls, Theory, Design, and Operation (1 week)

1. Identify and locate the following emission control systems in their entirety:
 - i. Crankcase Ventilation (PCV)
 - ii. Evaporative (EVAP)
 - iii. Exhaust Gas Recirculation(EGR)

- iv. Air Injection (AIS)
 - v. Ignition Spark Controls (SPK)
 - vi. Catalytic Converter (CAT)
 - vii. Other
2. Identify and locate the following emission control systems in their entirety:
 - i. Diesel Oxidation Catalyst (DOC)
 - ii. Periodic Trap Oxidizer (PTOX)
 - iii. Diesel Particulate Trap or Filter (DPF)
 - iv. Diesel Selective Catalyst Reduction (SCR)
 3. Check Exhaust Gas Recirculation (EGR) system operation, for vehicles in which the Smog Check EGR functional test applies (traditional, back pressure, computer controlled).

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LEVEL 2 LAB TASKS

A. Administrative (1 week)

1. Prepare a work estimate consistent with the Write It Right guidelines.
2. Prepare an invoice consistent with the Write It Right guidelines.

B. Equipment Maintenance (1 week)

1. Perform calibrations of the Emission Inspection System (EIS), including all sub-systems/equipment. Must perform two full calibrations.
2. Demonstrate knowledge and ability to inspect the EIS and replace maintenance items.
3. Demonstrate knowledge and ability to verify operation of EIS and OIS components, including the, fuel cap pressure tester, LPFET, RPM pickup, emissions sample hoses/tips, data lines, OBD connectors, OIS Data Acquisition Device (DAD) and peripheral equipment.

C. Visual Inspection (1 week)

1. Describe and determine vehicle emissions certification type.
2. Identify and record the required emission controls for at least three different vehicle makes, using ECS guides and emission control labels.
3. Identify exhaust system components and distinguish between single and dual exhaust systems.
4. Demonstrate the knowledge and ability to use electrical component locator to find emission control components (OBDII DLC, EGR solenoid, EVAP purge solenoid, etc).
5. Demonstrate the ability to check for CARB approval of aftermarket parts.
6. Describe and demonstrate knowledge and ability to perform the Liquid Fuel Leak inspection.
7. Describe and demonstrate knowledge and ability to perform the gasoline vehicle Visible Smoke Test.
8. Describe and demonstrate the knowledge and ability to perform the diesel Visible Smoke Test.
9. Identify and locate gasoline induction and fuel system components.
10. Identify engine management system components, actuators, sensors, and switches.
11. Demonstrate knowledge and ability to conduct a visual inspection on at least three different vehicles makes. Identify each required emission control system in its entirety (all components). Recognize and accurately enter/report the failure conditions.

D. Emissions Tests (1 week)

1. Demonstrate knowledge and ability to prepare a vehicle for an emission test, including safety, ventilation, and vehicle warm-up procedures.
2. Demonstrate knowledge and ability to perform emissions tests.

E. Functional Tests (1 week)

1. Demonstrate knowledge and ability to locate and connect scan tool or OIS/EIS to the diagnostic link connector (DLC) on at least three different vehicle makes.
2. Describe and demonstrate knowledge and ability to conduct the MIL functional test on at least three different vehicle makes.
3. Identify the vehicles subject to ignition timing functional test, include exception for non-adjustable timing.
4. Check and record the ignition timing setting on at least three different vehicle makes.
5. Describe and demonstrate knowledge and ability to conduct the EGR functional test on at least three different vehicle makes.
6. Describe and demonstrate the knowledge and ability to conduct the Fuel Cap Integrity Test.
7. Describe and demonstrate the knowledge and ability to conduct the LPFET functional test on at least three different vehicle makes.
8. Demonstrate knowledge and ability to upload data from the low pressure fuel evaporative tester.

F. General (1 week)

1. Perform at least four complete Smog Check inspections using the OIS and BAR-97 EIS.

25. METHODS OF INSTRUCTION--Course instructional methods may include but are not limited to

1. Audiovisual;
2. Case Study;
3. Computational Work;
4. Demonstration;
5. Discussion;
6. Group Work;
7. Guest Lecturers;
8. In-class writing;
9. Instruction through examination or quizzing;
10. Laboratory;
11. Lecture;
12. Outside reading;
13. Peer analysis, critique & feedback;
14. Performance;
15. Problem Solving;
16. Project-based learning;
17. Skills Development and Performance;
18. Written work;

26. OUT OF CLASS ASSIGNMENTS: Out of class assignments may include but are not limited to
 Out of class assignments may include but are not limited to bookwork and associate chapter homework, online supplemental instruction through Moodle, research based homework assignments on industry websites or factory information sources.

27. METHODS OF EVALUATION: Assessment of student performance may include but is not limited to

Quizzes

Written Assignments

Small group and individual lab tasks

Final Exam - A.S.E. certification exam format.

28. **TEXTS, READINGS, AND MATERIALS: Instructional materials may include but are not limited to**

Textbooks No Author. (2000) *No Textbook Is Required*, , No Publisher
This is for no textbook option
No Author. (2000) *No Textbook Is Required*, , No Publisher
This is for no textbook option

Manuals

Periodicals

Software

Other

29. **METHOD OF DELIVERY:** Face to face;

30. **MINIMUM QUALIFICATIONS:** Automotive Technology;

31. **APPROVALS:**

Origination Date 07/31/2015

Last Outline Revision
09/01/2016

Curriculum Committee Approval
09/15/2016

Board of Trustees
11/10/2016

State Approval

UC Approval
UC Approval Status

CSU Approval
CSU Approval Status

IGETC Approval
IGETC Approval Status

CSU GE Approval
CSU GE Approval Status

Data Element Changes

Data Justification The state mandated curriculum requirements for smog inspector training have significantly changed in recent years warranting the creation of an new course. B39 is a new course that will replace B61. However, B61 should not be considered equivalent to B39.

Course Element Changes

Course Change Justification

Course ID (CB00) CCC000578354

TOP Code (CB03) 0948.00 - Automotive Technology*;

Course Credit Status (CB04) D - Credit - Degree Applicable;

Course Transfer Status (CB05) C = Not Transferable

Course Units of Credit Maximum High (CB06): 4

Course Units of Credit Minimum Low (CB07): 4

Course Basic Skills (BS) Status (CB08): N = Course is not a basic skills course.

SAM Code (CB09): C = Occupational;

Cooperative Education Course Status (CB10): Not part of Coop Work Exp;

Course Classification Code (CB11): Not Applicable, Credit Course;

Course Special Status (CB13): N - Not Special;

CAN Code (CB14):

CAN-Code Seq (CB15):

Course Prior to College Level (CB21): Not Applicable;

Course Non-Credit Category (CB22): Not Applicable, Credit Course;

Funding Agency Category (CB23): Not Applicable

Course Program Status (CB24): 1 - Program Applicable;

