

## COURSE SYLLABUS

**Course Title:** AUMT 2421-002 (4:2:6) Automotive Electrical Diagnosis and Repair

**Semester/Year:** Fall 2018

**Instructor:** Mr. Gary Ufford

**Office/Location:** Lubbock Center, 3907 Ave. Q, Lubbock, TX. 79412, Room 136B

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**Office Hours:** Check posted hours after classes begin or by appointment.

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### **I. GENERAL COURSE INFORMATION**

- A. Course Description: ( 4:2:6) – Prerequisite:** AUMT 1407. This course covers the repair of automotive electrical subsystems, lighting, instrumentation, and accessories. Emphasis will be on accurate diagnosis and proper repair methods using various troubleshooting skills and techniques. This course may be taught manufacturer specific.
- B. Course Goals/Objectives:** Utilizing appropriate safety procedures, the student will diagnose and repair lighting systems; inspect, test, and repair various automotive accessories; troubleshoot malfunctions and effect necessary repairs to instrumentation, gauges, and sending units; and make proper repairs to wiring and wiring harnesses.
- C. Course Competencies:** A = 100-90 B = 89-80 C = 79-70 F = 69 or below  
A grade of a C or higher is required in AUMT 2421 in order to successfully complete this course.
- D. Academic Integrity.** It is the aim of the faculty of South Plains College to foster a spirit of complete honesty and a high standard of integrity. The attempt of any student to present as his own, any work which he has not honestly performed, is regarded by the faculty and administration as a most serious offense and renders the offender liable to serious consequences, possibly suspension. For further information concerning Cheating and Plagiarism, read the section on Academic Integrity in the SPC General Catalog. **If you have a question as to whether you may work with other students on any assignment, ASK YOUR INSTRUCTOR. On some assignments working with others is encouraged.**
- E. SCANS and Foundation Skills.** Specific SCANS competencies and foundation skills applicable to this course are listed adjacent to each objective in the course objective table. They include: Foundation Skills (F): 1,2,3,4,5,6,8,9,10,11,12.  
Competencies (C): 5,6,7,15,16,18,19,20. A complete list of SCANS competencies and foundation skills is attached at the end of this syllabus.

- F. **Verification of Workplace Competencies-Technical Education Division.** The learning outcomes of this course will prepare the student to meet the competencies measured in a comprehensive elective course experience (Course #s AUMT 1366 and AUMT 2366). In addition the student will also be prepared to take the ASE Student Certification test for Electrical Systems.

## II SPECIFIC COURSE/INSTRUCTOR REQUIREMENTS

### A. Textbook & Other Required Materials:

1. Halderman, James D. Automotive Technology Principles, Diagnosis ,and Service 5th edition, Pearson Publishers, 2016 (with on-line curriculum)
2. 8 1/2" x 11" Notebook for note taking and assignments
3. Safety Glasses
4. A calculator with a reciprocal key

- B. **Class Attendance Policy.** Students are expected to attend all classes in order to be successful in a course. The student may be administratively withdrawn from the course when absences become excessive **without notice. Excessive absences means 4 (four) or more absences for any reason. Excessive absences cause you to miss key points of a class and show you are not reliable/dependable for employment Two (2) tardies will count as one absence. Leaving class without notifying your instructor is considered an absence, regardless of the time you left.**

When an unavoidable reason for class absence arises, such as illness, an official trip authorized by the college or an official activity, the instructor may permit the student to make up work missed. It is the student's responsibility to complete work missed within a reasonable period of time as determined by the instructor. Students are officially enrolled in all courses for which they pay tuition and fees at the time of registration. Should a student, for any reason, delay in reporting to a class after official enrollment, absences will be attributed to the student from the first class meeting.

Students who enroll in a course but have "Never Attended" by the official census date, as reported by the faculty member, will be administratively dropped by the Office of Admissions and Records. A student who does not meet the attendance requirements of a class as stated in the course syllabus and does not officially withdraw from that course by the official census date of the semester, may be administratively withdrawn from that course and receive a grade of "X" or "F" as determined by the instructor.

It is the student's responsibility to verify administrative drops for excessive absences through MySPC using his or her student online account. If it is determined that a student is awarded financial aid for a class or classes in which the student never attended or participated, the financial aid award will be adjusted in accordance with the classes in which the student did attend/participate and the student will owe any balance resulting from the adjustment.

- C. **Assignment Policy:** All assignments are due at the beginning of class on the due date unless otherwise stated by your instructor. **Part of these assignments can be on-line through the on-line curriculum, you should log on to this at the beginning of the semester in order to complete them on time. There may be no makeup assignments and no late assignments will be accepted.** The dates printed in this syllabus can change. Every effort will be made to inform students of those changes, but the students are ultimately responsible for all assignments regardless of any changed dates. Please check the dates with your instructor throughout the course.
- D. **Grading Policy/ Procedure and/or Methods of Evaluation:** All exams are mandatory for effective student evaluation. Exams will cover theory and practical skills pertaining to all aspects of material presented. Adequate study time should be set aside for exam reviews. **There may be no makeup exams. All fees owed to South Plains College, including projects, are required to be paid in full before you take your final exam.** The ASE Student Certification test mentioned above can be used in place of your final exam.
- You will be evaluated during this course by the following method:  
Unit exams, written assignments, pop quizzes, and attendance = 25%  
Lab sheets, Unit skills tests = 50% (approximately 4 skills tests)  
Final Exam: = 25%

A unit skills test is a measure of how well you follow instructions, your safety in the shop, your use of tools, your cleanliness in the work area and your attention to detail while you perform diagnostics or repairs within a required time period.

A task sheet is used to plan and track students while they perform required skills in the shop. This is not used to average your grade, but it is a professional evaluation of how well you work independently and your level of expertise in completing assigned tasks. Prospective employers will want to see this during an interview, so please follow the shop and repair procedures to the best of your ability.

- E. **Special Requirements: A student's conduct is expected to follow the guidelines stated in the college catalogue and student handbook, any deviation will result in immediate disciplinary action. No smoking, chewing, or dipping is permitted in the building or outside the back doors of the shop and food and drinks are not allowed in any classroom, lab or shop.** These activities will be limited to break time in the designated areas only. Breaks will be limited to 20 minutes. A detailed list of lab/shop guidelines will be handed to you at the beginning of class, you are expected to follow them whenever you are in the shop. Please turn off all cell phones, pagers, etc. during class. Do not park on the back lot unless preauthorized by your instructor, unauthorized vehicles can be towed at the owner's expense.
- Dress Code:** The Automotive Program requires you to dress appropriately. Flip flops or opened toed shoes are not allowed in the shop, proper foot attire should be worn to protect your feet, leather work boots are recommended. Jeans/pants will be worn so that neither one falls to your thighs or knees, belts must hold them at your waist line. Safety glasses will be worn at all times in the shop. If a student fails to comply with the above dress code, he or she, will be sent home and given an absence for that day.

## **LUBBOCK CAMPUS GUIDELINES**

### **CHILDREN ON CAMPUS**

Many of the students attending classes at South Plains College - Lubbock Camps are also parents who value the opportunity to participate in higher education. Sometimes students are faced with the decision of whether to remain at home with their children, bring children with them to class, or be absent from class. The following guidelines address concerns for the safety of children on campus and provide for an environment conducive to learning.

### **CHILDREN IN THE CLASSROOM**

**Students are not allowed to bring children to class** and will be asked to leave in the interest of providing an environment conducive for **all** students enrolled in the class. Students are responsible for adherence to the attendance requirements set forth by the instructor in the course syllabus.

### **UNATTENDED CHILDREN ON CAMPUS**

**Children may not be left unattended.** In order to provide for the safety of children on campus, parents or other guardians are responsible for supervising children while utilizing services or conducting business on campus.

### **DISRUPTIVE CHILDREN**

**Disruptive children will not be allowed to interfere with college business.** Parents or other guardians are responsible for supervising and controlling the behavior of children they have brought on campus.

### **Diversity Statement**

In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

### **Americans with Disabilities Act Statement**

Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Disability Services Office.

For more information, call or visit the Disability Services Office at Levelland (Student Health & Wellness Office) 806-716-2577, Reese Center (Building 8) & Lubbock Center 806-716-4675, or Plainview Center (Main Office) 806-716-4302 or 806-296-9611.

### **GENERAL SAFETY ON CAMPUS**

South Plains College recognizes the importance of safety on campus. The protection of persons and property is a responsibility which we all share. Personal safety begins with the individual. The following guidelines are intended to assist you in protecting yourself and to encourage practices that contribute to a safe environment for our campus community.

- Never leave your personal property unsecured or unattended.
- Look around and be aware of your surroundings when you enter and exit a building.
- Whenever possible, avoid walking alone, particularly after dark. Walk to your vehicle with other class members or request that the Security Guard walk you to your car.
- When approaching your vehicle, keep your keys in your hand; look under your car and in the back seat and floorboard. Lock the doors as soon as you are inside your car.

### **FOOD AND DRINK IN CLASSROOMS**

It is the policy of South Plains College not to permit food or drink in the classrooms or laboratories.

<p><b>In case of emergency, contact the following numbers, but DO NOT leave a voice mail message.</b> <b>716-4677 – ATC      716-2923 – Reese Center (mobile 806-893-5705)</b></p>
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	<b>Course Objectives:</b>	
	Upon completion of this course, you will be able to:	
F1,2,5,6,8,12	! define the terms voltage, current and resistance.	C5,6,7,15
F1,2,5,6,8,12	! discuss the properties of conductors and factors that determine resistance.	C5,6,7,15
F1,2,5,6,8-12	! identify the types of circuits and discuss how they operate in an electrical system.	C5,6,7,15
F1,2,5,6,8-12	! understand the concepts of magnetism and electromagnetism and discuss how they are used in automotive electrical systems.	C5,6,7,15
F1,2,5,6,8-12	! identify diodes, transistors, and other electronic components.	C5,6,7,15
F1,2,5,6,8-12	! list and discuss the three types of circuit faults and know troubleshooting techniques associated with them.	C5,6,7,15,16, 18-20
F1-6,8-12	! know how to read electrical schematics and use them to locate potential problems.	C5,6,7,15
F1-6,8,12	! know basic troubleshooting techniques associated with all electrical accessories.	C5,6,7,15,16, 18-20

<b>Content Outline</b>			
<b>Unit 1: Review of Terminology, Circuit Identification, and the Use of Test Devices</b>			
Unit Objectives:			
Upon completion of this unit, you will be able to:			
F1,2,5,6,8,12	!	define voltage, current and resistance.	C5,6,7,15
F1,2,5,6,8,12	!	list the properties of conductors.	C5,6,7,15
F1,2,5,6,8,12	!	list and discuss the factors that determine resistance.	C5,6,7,15
F1-6,8-12	!	restate Ohm's law and calculate problems using the formula $E=IR$ .	C5-7,15,18,19
F1,2,5,6,8,12	!	name the 3 types of circuits used in automobiles and discuss how they operate.	C5,6,7,15
F1,2,5,6,8,12	!	discuss what voltage drop is and its significance in the understanding of electrical system operation.	C5,6,7,15
F1-6,8-12	!	perform repairs on wiring harnesses.	*
F1,2,5,6,8,12	!	solder connections with a soldering iron.	*C5-7,15,16,18-20
F1,2,5,6,8,12	◆	Understand magnetism, magnetic fields, electromagnetism, and their relationship to vehicle applications	C5,6,7,15
<b>Unit 2: Review of Schematic Reading, Diagnosing, and Testing Electrical Circuits</b>			
Unit Objectives:			
Upon completion of this unit, you will be able to:			
F1,2,5,6,8,12	!	understand how to read an electrical schematic.	C5,6,7,15
F1,2,5,6,8,12	!	identify loads, protection controls, and the positive and ground sides of electrical circuits.	C5,6,7,15
F1,2,5,6,8,12	!	diagnose and repair horn circuit problems.	C5,6,7,15
F1,2,5,6,8-12	!	check electrical continuity with a test light and ohmmeter.	C5,6,7,15,18
F1,2,5,6,8-12	!	check voltage and voltage drop with analog and digital voltmeters.	C5,6,7,15
F1,2,5,6,8-12	!	check current flow with analog and digital ammeters.	C5,6,7,15
F1,2,5,6,8-12	!	inspect, test, and replace circuit protection devices.	C5,6,7,15
F1,2,5,6,8-12	!	locate shorts to ground in electrical circuits.	C5,6,7,15

<p>F1,2,5,6,8-12 F1,2,5,6,8-12 F1,2,5,6,8-12 F1,2,5,6,8-12 F1,2,5,6,8-12 F1,2,5,6,8-12</p>	<p><b>Unit 3: Exterior Lighting Circuits</b> Unit Objectives: Upon completion of this unit, you will be able to:</p> <ul style="list-style-type: none"> <li>• Understand how a brake light circuit works electrically</li> <li>• Understand how a turn signal circuit works electrically</li> <li>• Understand how a headlight, park light, and taillight circuit works electrically</li> <li>• Understand how an automatic headlight system works electrically Includes Hybrid Vehicles</li> <li>• Understand how a daytime running light system works electrically. Includes Hybrid Vehicle.</li> <li>• Perform diagnostics and repairs within any exterior lighting circuit including hybrid vehicles</li> </ul>	<p>C5,6,7,15 C5,6,7,15 C5,6,7,15 C5,6,7,15 C5,6,7,15 C5,6,7,15,16, 18-20</p>
<p>F1,2,5,6,8-12 F1,2,5,6,8-12 F1,2,5,6,8-12 F1,2,5,6,8,12 F1,2,5,6,8,12 F1,2,5,6,8,12 F1,2,5,6,8,12 F1,2,5,6,8,12 F1,2,5,6,8,12</p>	<p><b>Unit 4 : Gauges and Instrumentation</b> Unit Objectives: Upon completion of this unit, you will be able to:</p> <ul style="list-style-type: none"> <li>• Understand how a fuel , temperature, oil pressure, and charging gauge or light works electrically. Including hybrid vehicles</li> <li>• Understand the purpose of using correct ESD precautions</li> <li>• Understand how instrument panel lights work electrically. Includes hybrid vehicles.</li> <li>• Test and repair printed circuits</li> <li>• Understand how a VSS assembly works electrically</li> <li>• Perform diagnostics and repairs within any fuel, temperature, oil pressure, and charging system gauge or light circuit. Includes Hybrid Vehicles.</li> <li>• Perform diagnostics and repairs to the instrument panel lights. Includes Hybrid Vehicles.</li> <li>• Perform diagnostics and repairs to a VSS circuit</li> </ul>	<p>C5,6,7,15,16, 18-20 C5,6,7,15,16, 18-20 C5,6,7,15 C5,6,7,15,16, 18-20 C5,6,7,15,16, 18-20 C5,6,7,15,16, 18-20 C5,6,7,15,16, 18-20 C5,6,7,15,16, 18-20</p>

<p>F1,2,5,6,8-12  F1,2,5,6,8-12  F1,2,5,6,8-12  F1,2,5,6,8-12</p> <p>F1,2,5,6,8-12  F1,2,5,6,8-12</p> <p>F1,2,5,6,8-12</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p>	<p><b>Unit 5: Accessory Circuits</b>  Unit Objectives:  Upon completion of this unit, you will be able to:</p> <ul style="list-style-type: none"> <li>• Diagnose incorrect windshield wiper and washer operation</li> <li>• Diagnose incorrect operation of cruise control systems</li> <li>• Understand how a blower control circuit works electrically</li> <li>• Understand how an A/C compressor control circuit works electrically (Includes Hybrid systems)</li> <li>• Understand how an electric cooling fan circuit works electrically</li> <li>• Functionally use a scantool to diagnose electrical circuits including body electronic and Hybrid system circuits</li> <li>• Check for module communication errors using a scan tool, including OBDII, CAN and Hybrid systems.</li> <li>• Diagnose incorrect operation of motor-driven accessory circuits, including electric door and hatch/trunk locks</li> <li>• Disarm and enable an airbag system for vehicle service</li> <li>• Diagnose supplemental restraint system (SRS) concerns</li> <li>• Diagnose incorrect heated glass operation</li> <li>• Diagnose and correctly repair any of the above circuits including Hybrid Vehicles where applicable. ( i.e. SRS, motor driven)</li> </ul>	<p>C5,6,7,15,16,  18-20</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p> <p>*</p>
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**Electrical Diagnosis and Repair  
Assignment and Exam Schedule**

**Unit 1:** Review of Term., Circuit Id., Use of Test Devices; August 27th – September 6th

**Unit 1 Assignment: Log on to the on-line curriculum.** Review chapters 39, 40, 41, 42, & 44 in your textbook. Please spend quality time with the material related to the objectives in unit1, under content outline of this syllabus. Complete the handed out assignment and turn in on the due date to be graded.

**Unit 1 Assignment Due Date: September 20th**

**Unit 2:** Review of Schematic Reading, Diagnosing and Testing Electrical Circuits; September 10th –Sept. 20th

**Unit 2 Assignment:** Read chapters 45, 46, 47 & 48 in your textbook. Complete all assigned lab projects.

Review exercises 1,2,3,6&7 from your AUMT 1407 class. Complete the assigned handout and turn in for a grade.

**Unit 2 Assignment Due Date: September 20th**

**Units 1 & 2 Written Test: September 20th (possibly on-line)**

**Units 1 & 2 Skills Test: September 20th**

**Unit 3:** Exterior Lighting Circuits; September 24th – October 11th

**Unit 3 Assignment:** Read chapter 56 in your textbook. **Complete the Chapter Quiz Questions at the end of Ch. 56 and turn in on the due date. Complete all assigned lab projects.**

**Unit 3 Assignment Due Date: October 11th**

**Unit 3 Written Test: October 11th (possibly on-line)**

**Unit 3 Skills Test: October 11th**

**Fall Break is on October 12th No Classes**

**Unit 4:** Gauges and Instrumentation October 15th –November 8th

**Unit 4 Assignment:** Read chapter 57 in your textbook. **Complete the Chapter Quiz Questions at the end of Ch. 57 and turn in on the due date. Complete all assigned lab projects.**

**Unit 4 Assignment Due Date: November 8th**

**Unit 4 Written Test: November 8th (possibly on-line)**

**Unit 4 Skills Test: November 8th**

**Thanksgiving Holiday November 21st – 23rd**

**Unit 5:** Accessory Circuits ; November 12th – December 6th

**Unit 5 Assignment:** Read chapters 58, 59 & 60 in your textbook. **Complete the Chapter Quiz Questions at the end of Ch. 58, 59, & 60 and turn in on the due date.** Complete all assigned lab projects.

**Unit 5 Assignment Due Date: December 6th**

**Unit 5 Written Test: December 6th (possibly on-line)**

**Unit 5 Skills Test: December 6th**

**Final Exam: Your final exam is scheduled for December 11th at 11:15 am. Please allow yourself adequate study time, this will be a comprehensive test.**

## SCANS COMPETENCIES

- C-1 **TIME** - Selects goal - relevant activities, ranks them, allocates time, prepares and follows schedules.
- C-2 **MONEY** - Uses or prepares budgets, makes forecasts, keeps records and makes adjustments to meet objectives.
- C-3 **MATERIALS AND FACILITIES** - Acquires, stores, allocates, and uses materials or space efficiently.
- C-4 **HUMAN RESOURCES** - Assesses skills and distributes work accordingly, evaluates performances and provides feedback.

### **INFORMATION - Acquires and Uses Information**

- C-5 Acquires and evaluates information.
- C-6 Organizes and maintains information.
- C-7 Interprets and communicates information.
- C-8 Uses computers to process information.

### **INTERPERSONAL-Works With Others**

- C-9 Participates as members of a team and contributes to group effort.
- C-10 Teaches others new skills.
- C-11 Serves Clients/Customers-works to satisfy customer's expectations.
- C-12 Exercises Leadership-communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
- C-13 Negotiates-works toward agreements involving exchanges of resources; resolves divergent interests.
- C-14 Works With Diversity-works well with men and women from diverse backgrounds.

### **SYSTEMS-Understands Complex Interrelationships**

- C-15 Understands Systems-knows how social, organizational, and technological systems work and operates effectively with them.
- C-16 Monitors and Corrects Performance-distinguishes trends, predicts impacts on system operations, diagnoses systems performance and corrects malfunctions.
- C-17 Improves or Designs Systems-suggests modifications to existing systems and develops new or alternative systems to improve performance.

### **TECHNOLOGY-Works With a Variety of Technologies**

- C-18 Selects Technology-chooses procedures, tools, or equipment, including computers and related technologies.
- C-19 Applies Technology to Task-understands overall intent and proper procedures for setup and operation of equipment.
- C-20 Maintains and Troubleshoots Equipment-prevents, identifies, or solves problems with equipment, including computers and other technologies.

## FOUNDATION SKILLS

### **BASIC SKILLS–Reads, Writes, Performs Arithmetic and Mathematical Operations, Listens and Speaks**

- F-1 Reading–locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
- F-2 Writing–communicates thoughts, ideas, information and messages in writing and creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
- F-3 Arithmetic–performs basic computations; uses basic numerical concepts such as whole numbers, etc.
- F-4 Mathematics–approaches practical problems by choosing appropriately from a variety of mathematical techniques.
- F-5 Listening–receives, attends to, interprets, and responds to verbal messages and other cues.
- F-6 Speaking–organizes ideas and communicates orally.

### **THINKING SKILLS–Thinks Creatively, Makes Decisions, Solves Problems, Visualizes and Knows How to Learn and Reason**

- F-7 Creative Thinking–generates new ideas.
- F-8 Decision-Making–specifies goals and constraints, generates alternatives, considers risks, evaluates and chooses best alternative.
- F-9 Problem Solving–recognizes problems, devises and implements plan of action.
- F-10 Seeing Things in the Mind’s Eye–organizes and processes symbols, pictures, graphs, objects, and other information.
- F-11 Knowing How to Learn–uses efficient learning techniques to acquire and apply new knowledge and skills.
- F-12 Reasoning–discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

### **PERSONAL QUALITIES–Displays Responsibility, Self-Esteem, Sociability, Self-Management, Integrity and Honesty**

- F-13 Responsibility–exerts a high level of effort and perseveres towards goal attainment.
- F-14 Self-Esteem–believes in own self-worth and maintains a positive view of self.
- F-15 Sociability–demonstrates understanding, friendliness, adaptability, empathy and polite-ness in group settings.
- F-16 Self-Management–assesses self accurately, sets personal goals, monitors progress and exhibits self-control.
- F-17 Integrity/Honesty–chooses ethical courses of action