

COURSE SYLLABUS

Course Title: AUMT 1407-502 Automotive Electrical Systems (4:2:8)

Semester/Year: Fall 2017

Instructor: Mr. Edward Rincon

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

SOUTH PLAINS COLLEGE IMPROVES EACH STUDENTS LIFE

I. GENERAL COURSE INFORMATION

- A. Course Description: (4:2:8)** - This course is an overview of automotive electrical systems, including topics in operational theory, testing, diagnosis, and repair of batteries, charging and starting systems, and electrical accessories. Emphasis will be on electrical schematic diagrams and service manuals. Safety is emphasized throughout the course. Elements of the course may be taught manufacturer specific.
- B. Course Goals/Objectives:** Utilizing appropriate safety procedures, the student will interpret wiring schematics and symbols, explain electrical principals, explain the theory and principles of battery, starting, charging systems, and automotive electrical accessories. The student will demonstrate diagnosis and repair of battery, starting, charging systems, and electrical accessories; and demonstrate proper use of electrical test equipment. A complete detailed list of objectives is printed in table form and listed before the content outline of this syllabus.
- 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 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 , or 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, Copyright 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.** Satisfactory course completion requires classroom attendance and participation. Due to the amount of time required for lecture or lab activities, no make-up work can be scheduled. Four (4) absences, for whatever reason, will result in withdrawal by the instructor - no exceptions. Two tardies count as one absence. Leaving class without notifying your instructor is considered an absence, regardless of the time you left.

- 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 the on-line curriculum at the beginning of the semester in order to complete them on time. There will 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 will be no makeup exams - no exceptions. All fees owed to South Plains College, including projects, are required to be paid in full before you take your final exam.** The NA3SA 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%

Unit skills tests/Lab sheets = 50% (approximately 4)

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.

D. 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. Please turn off all cell phones, pagers, etc. during class. A detailed list of lab/shop guidelines will be distributed to you at the beginning of this class, you are expected to follow all guidelines when in the shop. **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.** All these activities will be limited to break time in designated areas only. Breaks will be limited to 20 minutes. **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.

CAMPUS GUIDELINES

CHILDREN ON CAMPUS

Many of the students attending classes at South Plains College 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 instructor 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 be.

ADA 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 through the Guidance and Counseling Centers at Reese Center (Building 8) [716-4606](tel:716-4606), or Levelland (Student Services Building) [716-2577](tel:716-2577). , Plainview Center Main Office: 806-716-4302 or 806-296-9611, or the Health and Wellness main number at 806-716-2529

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.

In case of emergency, contact the following numbers, but DO NOT leave a voice mail message.

Plainview Center Main Office: 806-716-4302 or 806-296-9611

Foundation Skills

COURSE OBJECTIVES

Competencies

Foundation Skills	COURSE OBJECTIVES	Competencies
	Course Objectives: Upon completion of this course, you will be able to:	
F1,2,5,6,8,12	! discuss properties of elements that cause them to be conductors, insulators, or semi-conductors.	C5,6,7,15
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
F1,2,5,6,8,12	! discuss battery design and construction and know the various methods of rating battery performance.	C5,6,7,15
F1-6,8,12	! know how to properly service and test batteries.	C5,6,7,15
F1-6,8,12	! understand the function of starting motors and be able to identify the components of starters.	C5,6,7,15
F1-6,8,12	! know the proper procedures for testing and servicing starting motors.	C5,6,7,15
F1-6,8,12	! identify the components of the charging system and their functions.	C5,6,7,15
F1-6,8,12	! know the proper procedures for testing and servicing charging systems.	C5,6,7,15
F1-6,8,12	! know how to read electrical schematics and use them to locate potential problems.	C5,6,7,15,16, 18-20
F1-6,8,12	! know basic troubleshooting techniques associated with all electrical accessories.	C5,6,7,15,16, 18-20

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Content Outline		
Unit 1: Terminology Circuit Identification and the Use of Test Devices		
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	◆ Discuss magnetism, magnetic fields, electromagnetism, and their relationship to vehicle applications	C5,6,7,15
Unit 2: Using Schematics, Diagnosing, and Testing Electrical Circuits		
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
	! locate shorts to ground in electrical circuits.	

	<p>Unit 3: Battery Service</p> <p>Unit Objectives: Upon completion of this unit, you will be able to:</p>	
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Describe how batteries are constructed, including the use of plates and separators to form elements 	C5,6,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Discuss battery ratings and how they are determined 	C5,6,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Discuss safety techniques for battery testing and service (includes Hybrid vehicle) 	C5,6,7,15
F1,2,5,6,8-12	<ul style="list-style-type: none"> ◆ Know proper handling techniques for batteries and associated tools and equipment (includes Hybrid vehicle) 	C5,6,7,15,18
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Discuss proper jump starting procedures 	C5,6,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Discuss proper battery charging techniques 	C5,6,7,15
F1,2,5,6,8-12	<ul style="list-style-type: none"> ◆ Determine causes of battery failure 	C5,6,7,15
F1,2,5,6,8-12	<ul style="list-style-type: none"> ◆ Perform an abnormal key off battery drain test 	C5,6,7,15
F1,2,5,6,8-12	<ul style="list-style-type: none"> ◆ Perform various other battery tests as indicated by the task verification list 	C5,6,7,15
	<p>Unit 4: Starting System Service</p> <p>Unit Objectives: Upon completion of this unit, you will be able to:</p>	
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Read an electrical schematic of a starting system and understand how the system works electrically 	C5,6,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Describe the purpose and operating principles of DC starting motors 	C5,6,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Identify and explain the different types of starter drive mechanisms 	C5,6,7,15
F1,2,5,6,8,12	<ul style="list-style-type: none"> ◆ Explain solenoid and magnetic switch operation 	C5,6,7,15
F1,2,5,6,8-12	<ul style="list-style-type: none"> ◆ Discuss the proper procedure for starter shimming 	C5,6,7,15,16,
	<ul style="list-style-type: none"> ◆ Perform starting system tests as indicated by the task verification list 	18-20

	<p>Unit 5: Charging System Service Unit Objectives: Upon completion of this unit, you will be able to:</p>	
F1,2,5,6,8,12	! read an electrical schematic of a charging system and understand how the system works electrically.	C5,6,7,15
F1,2,5,6,8,12	! discuss the purpose and operation of charging systems.	C5,6,7,15
F1,2,5,6,8,12	! describe how AC current is developed in the alternator and rectified to DC.	C5,6,7,15
F1,2,5,6,8,9,12	! identify components of the charging system.	C5,6,7,15
F1,2,5,6,8,9,12	! compare different types of alternators and voltage regulators.	C5,6,7,15
F1,2,5,6,8,9,12	! discuss how to determine the serviceability of rotors, stators, diodes and rectifier assemblies.	C5,6,7,15
F1,2,5,6,8-12,14	! perform charging systems tests as indicated by the task verification list.	C5,6,7,15,16,18-20
F1,2,5,6,8-12,14	! Perform a jump assist procedure on a Hybrid vehicle following manufacturer procedures	C5,6,7,15,16,18-20
	<p>Unit 6: Using Schematics Diagnosing and Testing Accessory Circuits Unit Objectives: Upon completion of this unit, you will be able to:</p>	
F1-6,8-12	! diagnose wiper operation problems.	C5,6,7,15
F1-6,8-12	! inspect, test, and replace pulse wiper controls.	C5,6,7,15
F1-6,8-12	! inspect, test, and repair wiper circuit switches and wiring.	C5,6,7,15
F1-6,8-12	! diagnose and repair power door lock circuits	C5,6,7,15
F1-6,8-12	! diagnose and repair RKE systems	C5,6,7,15
F1-6,8-12	! diagnose and repair automatic and power window systems	C5,6,7,15
F1-6,8-12	! inspect, test, and repair faults within the different electronic controlled systems on today's vehicles.	C5,6,7,15

**Automotive Electrical Systems
Assignment and Exam Schedule**

Unit 1: Terminology Circuit Identification Use of test Devices August 28th – September 12th

Unit 1 Assignment: In your textbook Read Chapters 39, 40, 41, & 47. Please spend quality time with the material related to the objectives in unit1, under content outline of this syllabus. **Log on to the on-line curriculum.** Complete the terminology list, and the Chapter Quiz questions for Ch's 39, 40, & 41. **All are due on Sept. 12th**

Labor Day September 4th

Unit 2: Using Schematics, Diagnosing and Testing Electrical Circuits September 13th – Sept.26th

Unit 2 Assignment: Read chapters 42, 44, & 45. Complete all assigned lab projects. Complete Terminology list, and Chapter Quiz questions for Ch's 42, 44, & 45. **This is due Sept. 23rd.**

Units 1 & 2 Written Test: Sept. 26th

Units 1 & 2 Skills Test: Sept. 26th

Unit 3: Battery Service September 27th –October 6th

Unit 3 Assignment: Read chapters 50& 51. **Complete the Terminology list, and Chapter Quiz Questions for chapters 50 & 51 and turn in on October 6th. Complete all assigned lab projects. Parts of chapters 89 & 90 will also be covered in this unit.**

Unit 3 Written Test: October 6th

Unit 3 Skills Test: October 6th

Fall Break October 13th

Unit 4: Starting System Service October 7th – October 27th

Unit 4 Assignment: Read chapters 52 & 53. **Complete the Terminology list, and Chapter Quiz Questions for chapters 52 & 53 and turn in on October 28th. Complete all assigned lab projects. . Parts of chapters 89 & 90 will also be covered in this unit.**

Unit 4 Written Test: October 27th

Unit 4 Skills Test: October 27th

Thanksgiving Holiday November 22rd – 24th

Unit 5: Charging System Service October 28th – November 15th

Unit 5 Assignment: Read Chapters 54 & 55. **Complete the Terminology list, and Chapter Quiz Questions for chapters 54 & 55 and turn in on November 15th. Complete all assigned lab projects. Parts of**

chapters 89 & 90 will also be covered in this unit.

Unit 5 Written Test: November 15th

Unit 5 Skills Test: November 15th

Unit 6: Using Schematics, Diagnosing and Testing Accessory Circuits November 16th - December 9th

Unit 6 Assignment: Read chapters 58 & 59. Read and study any handouts given to you. Complete all assigned lab projects.

Unit 6 Written Test: This will be included on the final exam.

Unit 6 Skills Test: This test will be given on a needed and time allowing basis only.

Final Exam: Your final exam is scheduled for December 12th at 10:00 am. Please allow yourself adequate study time, this will be a comprehensive test.

"Texas Senate Bill 11 (Campus Concealed Carry) does not go into effect for community colleges until August 1, 2017."

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.