

- I. COURSE DESCRIPTION:** This course was designed to provide the student with the ability to perform suspension inspection and a proper four-wheel alignment. The student will also be introduced to power and antilock braking systems. They will use scan tools to diagnose antilock brake system fault codes and perform system analysis using lab scopes and digital meters.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Perform suspension and steering analysis following manufacturers recommendations.
Potential Elements of the Performance:
 - Measure trim height.
 - Inspect ball joints.
 - Test shocks and struts.
 - Explain steering linkage inspection.
 - Check tire wear patterns and compare to vehicle faults found.
2. Measure the four wheel alignment of a vehicle and compare results to manufacturers specifications.
Potential Elements of the Performance:
 - Define and explain the effects of the following alignment related angles , camber, caster, toe, SAI, included angle, thrust angle and set back.
 - Illustrate the above mentioned angles.
 - Observe and perform alignment machine set up, mount instrumentation and measure vehicle.
3. Diagnose common vehicle steering and alignment problems.
Potential Elements of the Performance:
 - Explain causes for vehicles to pull to one side.
 - Define vehicle instability.
 - Outline vehicle wander.
 - Describe bump steer and memory steer.
 - Explain the causes of excessive body lean.
4. Describe the function, construction and operating principles of power assisted brake systems.
Potential Elements of the Performance:
 - Compare and contrast vacuum-assisted power brakes to

hydro boost and electro hydraulic types.

- Calculate boost assist using force, pressure and area.

5. Test power brake systems following manufacturers recommendations.

Potential Elements of the Performance:

- Perform a visual inspection
- Explain operational tests for vacuum assist , hydro boost and electro hydraulic.

6. Describe the purpose and fundamentals of anti-lock brake and traction control systems.

Potential Elements of the Performance:

- Explain velocity and acceleration.
- Compare and contrast wheel skid to wheel lock.
- Outline tire coefficient of friction pertaining to stopping and acceleration.
- Describe predetermined deceleration and accelerations rates.

7. Describe the construction and operation of anti-lock and traction control systems.

Potential Elements of the Performance:

- Explain accumulator and pump operation.
- Describe wheel speed sensor location and operation.
- Compare and contrast one, two, three and four channel systems.
- Outline the differences between integrated and none integrated systems.
- Explain hydraulic modulation.
- Outline the effects of using different sized tires.

8. Perform inspection and diagnostic procedures on ABS and traction control systems following manufacturers recommendations.

Potential Elements of the Performance:

- Perform a visual inspection.
- Scan system and extract data
- Retrieve trouble codes
- Explain hydraulic system pressure precautions.
- Test and verify wheel speed sensor operation.

III. TOPICS:

1. Perform suspension and steering analysis following manufacturers recommendations.
2. Measure the four wheel alignment of a vehicle and compare results to manufacturers specifications.
3. Diagnose common vehicle steering and alignment problems.
4. Describe the function, construction and operating principles of power assisted brake systems.
5. Test power brake systems following manufacturers recommendations.
6. Describe the purpose and fundamentals of anti-lock brake and traction control systems.
7. Describe the construction and operation of anti-lock and traction control systems.
8. Perform inspection and diagnostic procedures on ABS and traction control systems following manufacturers recommendations.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Modern Automotive Technology – Text & Workbook

Pens, pencils, calculator, 3-ring binder

*shop coat or coveralls

*CSA approved steel toe boots (high top)

*CSA approved safety glasses

*these items mandatory for shop

V. EVALUATION PROCESS/GRADING SYSTEM:

The final grade for this course will be based on the results of classroom, assignments and shop evaluations weighed as indicated:

Classroom – 60% of the final grade is comprised of term tests

Assignments – 10% of the final grade is comprised of a number of technical reports

Shop – 30% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude
(Student will be given notice of test and assignment dates in advance)

The following semester grades will be assigned to students:

| Grade | <u>Definition</u> | <i>Grade Point Equivalent</i> |
|--------------|--|-----------------------------------|
| A+ | 90 – 100% | 4.00 |
| A | 80 – 89% | 3.00 |
| B | 70 - 79% | 2.00 |
| C | 60 - 69% | 1.00 |
| D | 50 – 59% | 0.00 |
| F (Fail) | 49% and below | |
| CR (Credit) | Credit for diploma requirements has been awarded. | |
| S | Satisfactory achievement in field /clinical placement or non-graded subject area. | |
| U | Unsatisfactory achievement in field/clinical placement or non-graded subject area. | |
| X | A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. | |
| NR | Grade not reported to Registrar's office. | |
| W | Student has withdrawn from the course without academic penalty. | |

VI. SPECIAL NOTES:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 703 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.