

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: AUTO 200 Department: Automotive Technology

Course Title: Suspension and Steering Semester: Fall Year: 2008

Objectives/Competencies

Course Objective	Competencies
1. The student will develop an understanding of automotive tire and wheel properties including diagnosis and repair, both on and off the vehicle to meet manufacturer's specs.	1. Describe basic wheel and hub design. 2. Recognize the basic parts of a tubeless tire. 3. Explain tire ratings and designations in use today. 4. Remove and install a tire and wheel assembly, including torquing to specs. 5. Describe why certain factors affect tire performance including inflation pressure, tire rotation and tire thread. 6. Repair a damaged tire. 7. Describe the difference between static balance and dynamic balance. 8. Dynamically balance wheels off the vehicle. 9. Perform wheel and tire radial and lateral runout. 10. Describe tire purchasing considerations and maintenance.
2. The student will recognize and compare, using live vehicles, the seven different types of front suspension systems used on cars and light trucks and identify the name and specific function of components used on each type.	1. Identify, describe operation and list components used on a solid axle. 2. Identify, describe operation and list components used on a king pin axle.

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<p>3. The student will recognize the four types of front suspension springs used, their location and affect on sprung and unsprung weight of suspension components.</p>	<ol style="list-style-type: none"> 3. Identify, describe operation and list components used on a long art/short arm suspension. 4. Identify, describe operation and list components used on a twin "I" beam suspension. 5. Identify, describe operation and list components of a MacPherson strut suspension. 6. Identify, describe operation and list components of a modified MacPherson strut suspension. 7. Identify, describe operation and list components of a multilink suspension. <ol style="list-style-type: none"> 1. Locate and identify the coil spring in a front suspension. 2. List the front suspension components of a coil spring suspension that would be considered unsprung weight. 3. Locate and identify the leaf spring in a front suspension. 4. List the front suspension components of a leaf spring suspension that would be considered unsprung weight. 5. Locate and identify the torsion bar spring in a front suspension. 6. List the front suspension components of a torsion bar front suspension that would be considered unsprung weight. 7. Locate and identify the air spring in a front suspension. 8. List the front suspension components of an air spring front suspension that would be considered unsprung weight.
<p>4. The student will recognize and compare, using live vehicles, the three basic categories of rear suspension</p>	<ol style="list-style-type: none"> 1. Differentiate between non-independent, semi-independent and independent rear suspension systems.

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<p>systems used on cars and light trucks and identify the name and specific function of components used on each type.</p>	<ol style="list-style-type: none"> 2. Demonstrate why a non-independent system has greater load carrying capabilities, but sacrifices ride comfort. 3. Describe how the semi-independent systems incorporates aspects of both other systems. 4. Why an independent system has decreased load capabilities, but produces a higher level of comfort in its ride performance. 5. Name the type of springs used on each of the three rear suspension systems. 6. Explain the purpose of the rods used on a rear suspension system. 7. Identify rear lateral links used on a rear suspension system and explain its purpose. 8. Identify and describe the function of toe links used on a rear suspension.
<ol style="list-style-type: none"> 5. The students should develop an understanding of preventative maintenance and safe procedures for front and rear suspension systems. 	<ol style="list-style-type: none"> 1. Perform ball joint replacement on selected front suspensions. 2. Remove and reinstall a coil spring on a long arm over short arm suspension. 3. Remove and reinstall a coil spring from a MacPherson strut suspension. 4. Explain routine service procedures for suspension systems. 5. List the steps required to replace control arm and stabilizer bushings. 6. Test load carrying and follower type ball joints to

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<p>6. The student should develop an understanding of mechanical and hydraulic steering system operation and describe the function and operation of steering system components by performing service procedures on live vehicles and completing written lab routines.</p>	<p>determine if service is necessary.</p> <ol style="list-style-type: none"> 7. Remove and reinstall shock absorbers on front and rear suspension systems. 8. Practice removal and replacement procedures on various front and rear suspension components. 9. Practice removal and replacement of strut rods on MacPherson and modified MacPherson strut front and rear suspensions. 10. Demonstrate proper service procedures for determining loose or worn front and rear suspension components. <ol style="list-style-type: none"> 1. Name the three major subsystems that, when combined, make up the mechanical steering system. 2. Recognize the two types of steering gears in use today. 3. Describe how the movement of the steering wheel causes the wheels to turn. 4. Differentiate between manual and power assisted steering systems. 5. List the components of a power recirculating ball steering gear system. 6. Describe the operation of a power rack and pinion steering system. 7. Remove and reinstall, to factory specs, selected components of a recirculating ball steering linkage system. 8. Remove and reinstall, to factory specs, selected components of a rack and pinion steering gear system.

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<p>7. The student should develop an understanding of power steering pump diagnostics used on both rack and pinion and recirculating ball type steering gears.</p> <p>8. The student should develop an understanding of wheel alignment principles, associated tire wear patterns and handling concerns that can and cannot be corrected by wheel alignment.</p>	<p>9. Diagnose steering linkage for loose or worn components.</p> <p>10. Demonstrate proper lubrication techniques of steering linkage.</p> <p>11. Adjust the sector shaft on a recirculating ball steering gear.</p> <p>1. Demonstrate the use of the power steering analyzer to measure both pressure and volume.</p> <p>2. Using the analyzer, determine where a power assist problem is located within a system.</p> <p>3. Remove and reinstall a power steering pump pulley using appropriate tools.</p> <p>4. Adjust a power steering drive belt to factory specs.</p> <p>5. Determine proper level and condition of fluid in a power steering pump.</p> <p>6. Be able to inspect both high pressure and return line hoses from the pump to the steering gear.</p> <p>1. Recognize tire wear patterns caused by improper inflation.</p> <p>2. Recognize tire wear patterns caused by improper alignment angles.</p> <p>3. Define camber, toe, caster, alignment angles.</p> <p>4. Demonstrate accurate adjustment of the above angles on the alignment machine using live vehicles.</p> <p>5. Successfully complete all pre-alignment checks before beginning an alignment.</p> <p>6. Describe how caster, camber and toe affect vehicle</p>

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<p>9. The students should develop an understanding for the purpose of electronic steering and suspension systems compared to conventional steering and suspension systems and realize how the electronic systems can provide the driver with the best of both worlds.</p>	<p>handling.</p> <ol style="list-style-type: none"> 7. Define steering axis inclination and its effect on tire wear. 8. Describe how steering axis inclination and included angle can be used to determine frame damage. 9. Recognize positive, zero and negative scrub radius and its affect on handling and tire wear. 10. Recognize and define setback. 11. Perform two complete four-wheel alignments on front and rear wheel drive vehicles. <ol style="list-style-type: none"> 1. Describe the electronic steering system. 2. Identify purpose and function of the electronic steering system input components. 3. Identify purpose and function of the electronic steering system output components. 4. Provide general description of electronic steering system module operation. 5. Describe electronic suspension system. 6. Identify purpose and function of the electronic suspension system input components. 7. Identify purpose and function of the electronic suspension system output components. 8. Provide general description of electronic suspension system module operation. 9. Describe diagnostic equipment used on electronic steering and suspension systems. 10. Perform electronic steering and suspension diagnostic

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	procedures.