



## Outcome-based 18/SU Course Syllabus

**Course Rubric Number Section:** ABDR 1323 1001  
**Lecture-Lab-Credit:** 2-4-3  
**CIP Code:** 47.0603  
**Course Title:** Front and Rear Wheel Alignment  
**Course Description:** Study of vehicle steering components including alignment, tire rotation, and balancing.  
**Prerequisites:**  
**Co-requisites:**  
**Course Meets:** 1FC1 107 LEC W 01:00PM 02:50PM 1ACR 100 LAB W 08:00AM 11:40AM  
  
**Instructor:** Tracy Marshall  
**Office Phone Number:** 254 867-4854  
**Email Address:** tlmarsall@tstc.edu  
**Office Fax Number:** 254 867-2315  
**Building & Office Room Number:** 1FC1 120  
**Office Hours:** Monday 2:00pm-5:00pm

<b>Approved by:</b> Clint Campbell	<b>Date:</b> 2018-04-30
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### Course Outcomes

- CO1:** Identify the functions of steering components
- CO2:** Diagnose front and rear vehicle alignment angles
- CO3:** Demonstrate proper procedures when balancing and rotating tires
- CO4:** Align vehicles to manufacturers' specifications

### TSTC Grading Policy

(Grades for courses must be C or better)

Grade	Percent	Description	Grade Points
A	90-100	Excellent/Superior Performance Level	4
B	80-89	Above Required Performance Level	3
C	70-79	Minimum Required Performance Level	2
D	60-69	Below Required Performance Level	1
F	Below 60	Failure to meet Performance Requirements	0
IP	--	In Progress	
W	--	Withdrawal	0
CR	--	Credit	0
AUD	--	Audit of Course	0

See College Catalog for complete descriptions.

### Competencies Rating Scale

Rating Scale Key			
6	90+	Proficient	Student consistently performs the task accurately to industry

			standards without supervision.
5	80-89	Proficient	Student performs the task to industry standards with no supervision.
4	70-79	Proficient	Student performs the task to industry standards with little supervision. This is the minimum performance rating for STAR skill completion.
3	60-69	Exposed/Not Proficient	Student has been introduced to the task and can perform some of the tasks to industry standards.
2	50-59	Exposed/Not Proficient	Student has been introduced to the task, but cannot perform the task to industry standards.
1	0-49		Student was absent or did not complete assignment.

## Campus Standard Policies

The [Student Handbook](#) contains valuable information on campus policies and procedures.

- Student Code of Conduct
- Student Drug and Alcohol Testing Policy
- Plagiarism
- Student Grievances and Complaints

## Disability Services

Any student who, because of a disability, may require special accommodations in order to meet the course requirements, should contact the Disability Services office, as soon as possible, to make necessary arrangements. Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from the Disability Services office has been provided.

### Abilene Campus

Susan Hash  
Testing and Support Services  
Abilene Main Campus Bldg. Rm. 112  
325-734-3641

### Fort Bend Campus

Schauna Boynton  
Brazos Center Rm. 113  
346-239-3394

### Sweetwater Campus

Misty Walden  
Disability Services  
Student Support Services  
Lance Sears Building Rm. 140  
325-236-8292

### Breckenridge Campus

Lisa Langford  
Testing and Advisement located in  
The Main Building Rm. 106  
254-559-7731

### Harlingen Campus

Corina De La Rosa  
Disabilities Services  
Student Support Services  
Student Services Bldg. Rm. 216  
956-364-4521

### North Texas Campus

Amanda Warren  
Student Services, Room 227  
972-617-4724

### Brownwood Campus

Nicole Whitley  
Testing and Advisement  
Building 2 Rm. 120  
325-641-5955

### Marshall Campus

Annette Ellis  
Administration and Admissions Rm. 150  
909-923-3313

### Waco Campus

Marilyn Harren  
Disabilities Services Office  
Student Services Center Rm. 198  
254-867-3600

### Williamson County

Chemese Armstrong  
Enrollment Services Rm. B113C  
512-759-5907

## Tutoring Statement

The Supplemental Instruction & Tutoring Program at TSTC offers free tutoring and academic support services to help you achieve your academic and career goals. You can access the Tutoring Schedule, as well as *MyTSTC Video Tutor Library*, by visiting: [https://portal.tstc.edu/student/Student\\_Learning/Pages/Tutoring.aspx](https://portal.tstc.edu/student/Student_Learning/Pages/Tutoring.aspx) (shortened link: [goo.gl/Z9vJvY](https://goo.gl/Z9vJvY)). For more information, please contact Norma A. Salazar@ [956-364-4557](tel:956-364-4557).

## Learning Resource Center

The purpose of the TSTC Learning Resource Center is to serve the TSTC Community and support academic, advanced, specialized and emerging programs, contributing to the educational and economic development of the State of Texas. You can access the Learning Resource Center page at <https://portal.tstc.edu/employee/Departments/operations/Pages/Learning%20Resource%20Center.aspx>

## Resources

**Textbooks & Publications:**

Item	Title	Author	Publisher	Edition	ISBN
1	Front and Rear Wheel Alignment	ABDR 1323	Bookstore	Workbook	10412275

**Tools, Materials:**

Item	Resource	Quantity
1	Approved safety glasses (clear lens)	1
2	10-12' (3m) Metric retractable tape measure	1
3	3 ring loose leaf notebook	1
4	Spiral or paper for notebook	1
5	Pencils	2
6	Scantron	1

**Tool Resource Statement**

*Tools and materials must be acquired by the beginning of the third class week or the student will be dismissed until resources are complete*

<b>Grade Scheme</b>		
<b>Category Description</b>		<b>Category Value</b>
Written Assessments		1500
<b>Assessment Label:</b>	<b>Assessment Description</b>	<b>Assessment Value</b>
Safety Test:	Complete lab safety test during lab orientation	100.00
Test 2:	Camber and Caster Influence	100.00
Test 3:	Camber and Caster tolerance	100.00
Test 4:	01T1 - Suspension angles (comprehensive)	100.00
Test 5:	"Techniques for Front Wheel Alignment"	100.00
Test 6:	02T1 - Suspension diagnostics (comprehensive)	100.00
Homework 1:	Complete essays regarding "Alignment Wheel Meets Body" according to instructional handout	100.00
Test 7:	Suspension Parts Identification	100.00
Test 8:	STE 01 Wheels and Tires	100.00
Homework 2:	Complete test worksheet based on "Wheel Alignment" handout	100.00
Test 9:	03T1 - Tracking and Thrustline	100.00
Test 10:	SLA worksheet (in class project)	100.00
Test 11:	"Four Wheel Alignment"	100.00
Test 12:	04T1 - Suspension Diagnostics (comprehensive)	100.00
Homework 3:	Course Definitions due	100.00
<b>Category Description</b>		<b>Category Value</b>
Performance Assessments		1504
<b>Assessment Label:</b>	<b>Assessment Description</b>	<b>Assessment Value</b>
Lab 1:	Measure Toe and Wheel run out	188.00
Lab 2:	Measure Turning Radius	188.00
Lab 3:	Measure Camber and Caster using mechanical gauges	188.00
Lab 4:	SLA camber and caster exercise	188.00
Lab 5:	Demonstration of balancing a tire and wheel assembly	188.00
Lab 6:	Balance wheel/tire assembly	188.00
Lab 7:	Demonstration of the proper set up and operation of the Hunter 4-Wheel Alignment system	188.00
Lab 8:	Demonstrate of the proper set up and operation of the Hunter 4-Wheel Alignment system on an assigned lab vehicle	188.00
<b>Category Description</b>		<b>Category Value</b>
Final Exam		1500
<b>Assessment</b>	<b>Assessment Description</b>	<b>Assessment</b>

Label:	Assessment Description	Value
Final Exam:	Final Course Exam (comprehensive)	1,500.00
Total Assessment Points		<b>4,504.00</b>
Total Category Points		<b>4,504.00</b>
<b>A = 4,504-4,054</b>	<b>B = 4,053-3,603</b>	<b>C = 3,602-3,153</b>
		<b>D = 3,152-2,702</b>
		<b>F = 2,701-0</b>

<b>Description of Graded Elements of the Course</b>			
Assessment Label	Assessment Description/Course outcomes met	Assessment Value in Points	% of Final Grade
Safety Test	Complete lab safety test during lab orientation <b>Course outcomes met:</b> CO3	100.00	2.22%
Test 2	Camber and Caster Influence <b>Course outcomes met:</b> CO1, CO2	100.00	2.22%
Lab 1	Measure Toe and Wheel run out <b>Course outcomes met:</b> CO2, CO1	188.00	4.17%
Lab 2	Measure Turning Radius <b>Course outcomes met:</b> CO1, CO2	188.00	4.17%
Test 3	Camber and Caster tolerance <b>Course outcomes met:</b> CO2, CO1	100.00	2.22%
Test 4	01T1 - Suspension angles (comprehensive) <b>Course outcomes met:</b> CO1, CO2	100.00	2.22%
Lab 3	Measure Camber and Caster using mechanical gauges <b>Course outcomes met:</b> CO2, CO4	188.00	4.17%
Test 5	"Techniques for Front Wheel Alignment" <b>Course outcomes met:</b> CO1, CO2	100.00	2.22%
Lab 4	SLA camber and caster exercise <b>Course outcomes met:</b> CO4, CO2, CO1	188.00	4.17%
Test 6	02T1 - Suspension diagnostics (comprehensive) <b>Course outcomes met:</b> CO1, CO2, CO4	100.00	2.22%
Lab 5	Demonstration of balancing a tire and wheel assembly <b>Course outcomes met:</b> CO3	188.00	4.17%
Homework 1	Complete essays regarding "Alignment Wheel Meets Body" according to instructional handout <b>Course outcomes met:</b> CO2, CO1	100.00	2.22%
Test 7	Suspension Parts Identification <b>Course outcomes met:</b> CO1	100.00	2.22%
Test 8	STE 01 Wheels and Tires <b>Course outcomes met:</b> CO3	100.00	2.22%
Lab 6	Balance wheel/tire assembly <b>Course outcomes met:</b> CO3	188.00	4.17%
Homework 2	Complete test worksheet based on "Wheel Alignment" handout <b>Course outcomes met:</b> CO2, CO1	100.00	2.22%
Test 9	03T1 - Tracking and Thrustline <b>Course outcomes met:</b> CO2, CO1	100.00	2.22%
Lab 7	Demonstration of the proper set up and operation of the Hunter 4-Wheel Alignment system <b>Course outcomes met:</b> CO4, CO2	188.00	4.17%
Test 10	SLA worksheet (in class project) <b>Course outcomes met:</b> CO2, CO1	100.00	2.22%
Test 11	"Four Wheel Alignment" <b>Course outcomes met:</b> CO1, CO2	100.00	2.22%
Lab 8	Demonstrate of the proper set up and operation of the Hunter 4-Wheel Alignment system on an assigned lab vehicle <b>Course outcomes met:</b> CO4, CO2	188.00	4.17%
Test 12	04T1 - Suspension Diagnostics (comprehensive) <b>Course outcomes met:</b> CO1, CO2	100.00	2.22%
Homework 3	Course Definitions due <b>Course outcomes met:</b> CO2, CO1	100.00	2.22%

Final Exam	Final Course Exam (comprehensive) <b>Course outcomes met:</b> CO2, CO1	1,500.00	33.30%
		<b>4,504.00</b>	<b>100.00%</b>

## Description of Graded Elements of the Course:

Student test assessments will be graded on the ability to choose the correct answer in regard to multiple choice test questions or provide the correct answer to test questions that require a missing word or brief statement.

Performance assessments are designed to enhance the student's level of competency based on the course outcomes and expectations of the industry

Course Schedule			
Unit/ Week	Unit Description/Objectives	Assessment Label:Description	Due Date
1	Course Orientation and Policies		
	<ul style="list-style-type: none"> <li>Review syllabus</li> <li>Discuss purpose of course, requirements, and application to individual study of material</li> <li>Identify various types of suspension and steering and components</li> </ul>	<b>Safety Test:</b> Complete lab safety test during lab orientation <i>Study handout prior to next lab period</i> <i>Complete worksheet; due next lab period</i>	Week 1
2	Defining Camber and Caster		
	<ul style="list-style-type: none"> <li>Define purpose of angles</li> <li>Identify the vehicle influence</li> <li>Explain the tolerance of angles</li> </ul>	<i>Read Lesson handouts prior to next class</i> <i>Review camber and caster</i> <b>■ Identify angles using suspension examples in lab</b>	
3	Toe and Bump steer		
	<ul style="list-style-type: none"> <li>Define purpose of angles</li> <li>Review toe and bump steer using software on Hunter alignment equipment</li> <li>Measure total toe and adjust to zero spec using an assigned lab vehicle</li> </ul>	<i>Review Lesson handouts prior to next class</i> <b>Test 2:</b> Camber and Caster Influence <b>Lab 1:</b> Measure Toe and Wheel run out	Week 3 Week 3
4	Turning Radius: cause and effect of proper and improper turning radius		
	<ul style="list-style-type: none"> <li>Explain benefits of proper turning radius</li> <li>Explain how to measure and troubleshoot problems associated with turning radius</li> <li>Measure turning radius using turnplates on an assigned lab vehicle</li> </ul>	<i>Review Lesson handouts prior to next class</i> <i>Complete worksheets in class</i> <b>Lab 2:</b> Measure Turning Radius	Week 4
5	Steering Axis Inclination (SAI): discussion of SAI and its use in diagnosing alignment problems		
	<ul style="list-style-type: none"> <li>Define SAI and explain benefits of angle</li> <li>Explain how SAI is used as a diagnostic angle in collision repair</li> <li>Using a Bear #27 gauge and turnplates measure camber and caster on an assigned lab vehicle</li> <li>Diagnose condition of vehicle based on measured outcome</li> </ul>	<i>Review Lesson handouts prior to next class and alignment gauge handout prior to next lab</i> <b>Test 3:</b> Camber and Caster tolerance <b>Test 4:</b> 01T1 - Suspension angles (comprehensive) <b>Lab 3:</b> Measure Camber and Caster using mechanical gauges	Week 5 Week 5 Week 5
6	Included Angle (IA) and Scrub Radius: review of SAI and a discussion of IA, and scrub radius and their relationship to collision diagnostics		
	<ul style="list-style-type: none"> <li>Discuss SAI concepts and diagnostic advantages</li> <li>Define IA and Scrub Radius</li> </ul>	<i>Read "Techniques for Front Wheel Alignment" for test next class period. Review Lesson handouts</i>	

	<ul style="list-style-type: none"> <li>Discuss each angle as additional diagnostic references to collision repair</li> </ul>	<p><i>period. Review Lesson handouts</i></p> <p><i>Complete worksheets in class</i></p> <p><i>Skill development with lab projects</i></p>
7	Suspension Diagnostics: comprehensive discussion of alignment angles and the variable outcomes and benefits to damage diagnostics	
	<ul style="list-style-type: none"> <li>Given examples of damage, evaluate effects of improper vehicle alignment angles</li> <li>Discuss necessary adjustments or repairs needed to correct suspension</li> <li>Evaluate control arm movement using a mechanical gauge and a chassis with an SLA suspension</li> </ul>	<p><i>Review Lesson handouts prior to next class test over diagnostics</i></p> <p><b>Test 5:</b> "Techniques for Front Wheel Alignment"                      Week 7</p> <p><b>Lab 4:</b> SLA camber and caster exercise                                      Week 7</p>
8	Damage Analysis using I-CAR DAM 03 review steering and suspension components to and discuss possible damage situations.	
	<ul style="list-style-type: none"> <li>Given examples of damage, discuss steering and suspension damage situations</li> <li>Using selected lab vehicles complete steering and suspension identification worksheets during lab period</li> </ul>	<p><i>Review Lesson handouts prior to next class</i></p> <p><b>Test 6:</b> 02T1 - Suspension diagnostics (comprehensive)      Week 8</p> <p><i>Lab: Identification of suspension components</i></p>
9	Steering and Suspension and Diagnostics review of diagnostics and begin I-CAR STE 01: Identification of wheel and tire assemblies, and proper balancing procedures	
	<ul style="list-style-type: none"> <li>Using worksheet determine possible damage to suspension components</li> <li>Explain corrections to above suspension</li> <li>Identify wheel and tire characteristics</li> <li>Explain how to balance a wheel/tire assembly</li> </ul>	<p><i>Review Lesson handouts prior to next class</i></p> <p><i>Complete worksheets in class</i></p>
10	Tires and Wheels I-CAR STE 01: continued identification of proper tire repair, rotation, and wheel bearing maintenance	
	<ul style="list-style-type: none"> <li>Explain how to repair a tire</li> <li>Explain wheel bearing cleaning and replacement</li> <li>Explain methods of tire rotation</li> <li>Participate in demonstration of balancing a wheel/tire assembly</li> </ul>	<p><i>Review Lesson handouts prior to next class</i></p> <p><b>Lab 5:</b> Demonstration of balancing a tire and wheel                      Week 10 assembly</p> <p><i>Study Steering and Suspension Identification handout for test next week</i></p> <p><b>Homework 1:</b> Complete essays regarding "Alignment Wheel Meets Body" according to instructional handout      Week 11</p>
11	Tracking and Thrust Angle identification of proper vehicle tracking, ride height, and associated	
	<ul style="list-style-type: none"> <li>Identify proper tracking tolerance and associated problems</li> <li>Explain thrust angle and ride height</li> <li>Explain methods of determining ride height</li> </ul>	<p><i>Review Lesson handouts prior to next class</i></p> <p><b>Test 7:</b> Suspension Parts Identification                                      Week 11</p> <p><b>Test 8:</b> STE 01 Wheels and Tires    Week 11</p> <p><b>Lab 6:</b> Balance wheel/tire assembly    Week 11</p> <p><b>Homework 2:</b> Complete test worksheet based on "Wheel Alignment" handout      Week 12</p>
12	Damage Analysis review of steering and suspension worksheets to determine possible damage situations and correction alternatives.	
	<ul style="list-style-type: none"> <li>Small group evaluation of steering and suspension damage situations</li> <li>Identify problems and corrective procedures needed to achieve stated specifications</li> <li>Participation in the set up and operation of the Hunter Alignment system</li> <li>Evaluate lab vehicle and adjust components to manufacturers? specifications</li> </ul>	<p><b>Test 9:</b> 03T1 - Tracking and Thrustline    Week 12</p> <p><b>Lab 7:</b> Demonstration of the proper set up and operation of the Hunter 4-Wheel Alignment system      Week 12</p> <p><i>Study "Four Wheel Alignment" handout for test next class period</i></p> <p><i>Complete page one of Definitions for instructor review for next class period</i></p>
13	Short/Long Arm Suspension (SLA): evaluate methods of adjustment and outcomes of this suspension	
	<ul style="list-style-type: none"> <li>Given examples of the SLA suspension the student will identify the different types of adjustments</li> <li>Determine effects based on worksheet provided in class</li> </ul>	<p><i>Review Lesson handouts prior to next class</i></p> <p><b>Test 10:</b> SLA worksheet (in class project)                                      Week 13</p> <p><b>Test 11:</b> "Four Wheel Alignment"    Week 13</p> <p><b>Lab 8:</b> Demonstrate of the proper set up and operation of the Hunter 4-Wheel Alignment system on an assigned lab vehicle      Week 13</p>

		<i>Review packet for comprehensive Diagnostic test next class period and upcoming Course Final</i>
14	Final Review review of concepts and course material in preparation for Final Exam	
	<ul style="list-style-type: none"> <li>Review for final exam. Evaluate past handouts and information to prepare for final</li> <li>Complete any outstanding lab objectives</li> </ul>	<i>Review past course handouts and material for Final Exam next class period</i> <b>Test 12:</b> 04T1 - Suspension Diagnostics (comprehensive) <span style="float: right;">Week 14</span> <i>Complete Definitions for next class period</i> <i>Study for Final Exam</i>
15	: Final Exam and Completion of Lab Objectives	
	<ul style="list-style-type: none"> <li>Complete a comprehensive written final exam with at least 70% accuracy</li> <li>Participate in clean up of lab areas and attend department awards ceremony</li> </ul>	<b>Homework 3:</b> Course Definitions due <span style="float: right;">Week 15</span> <b>Final Exam:</b> Final Course Exam (comprehensive) <span style="float: right;">Week 15</span> <i>Clean up lab, tools and equipment as assigned by instructor</i> <i>ACM department awards ceremony</i>

The Auto Collision Department or acting Instructor reserves the right to substitute or rearrange lecture topics, lab projects, homework, tests, or assignments based on the needs of the class or requirements to meet course outcomes and objectives. Once weekly 1323 objectives are completed, additional lab time may be used for other class objectives within semester.

### ***Instructor Participation Policy:***

A student is expected to attend and participate during the scheduled period of instruction (lecture and lab). This begins with the first scheduled class day of the term. A student deemed a non-participant for more than 10% ( **3.0** hours) of the lecture or 10% ( **6.0** hours) of the lab periods, regardless of grades earned on assignments, will have to repeat the course.

A student is considered tardy up to 15 minutes into the scheduled lecture or lab, and thereafter will be considered a non-participant for that period of instruction.

## ***Course Policies:***

### ***Safety Procedures***

Students are required to participate in a safety lecture prior to performing in the laboratory portion of the course. A written test will be given to each participating student covering the presented safety materials. Students must complete the safety test with 100% accuracy prior to receiving lab assignments.

All lecture and laboratory safety rules and regulations will be followed in every detail. Failure to comply with this policy will result in dismissal from class until further notice.

### ***Acceptance Attire***

- NIOSH approved clear safety glasses will be worn at all times
- Full-toed shoes (no slippers, sandals, flip-flops, or bare feet)
- Full length pants (must extend past ankles)
- Pants must fit around waist within 3 inches of belly button
- Shirts (no sleeveless or tank tops)
- Shirts with and without buttons can be worn with instructor approval on neck opening exposure
- Clothing must be reasonably snug fitting (not excessively loose, baggy, torn)
- An inappropriate slogan on clothing is not acceptable.
- Jogging clothes, sweats, or warm-ups are not acceptable.
- Acceptable headgear: ball caps or bump caps (**No** do-rags, bandanas or shower caps)
- The Instructor has the final authority concerning matters of dress

### ***Classroom and Lab Behaviors***

- Smoking in classrooms, laboratories and shops are prohibited
- Smoking is permitted only in designated areas
- Smoking is prohibited within 20 feet of a building, when permitted

- Smoking is prohibited within the fenced area surrounding the ACM and CAT Labs.
- The consumption of drinks, candy and other food items is restricted to lounge areas
- Eating or drinking in laboratories are hazardous because of the toxic nature of lab materials being handled
- No horseplay at any time
- Be responsible – Be a professional

## ***Late Work/Test Policies***

All students are required to be present for class. However, unexpected circumstances will occur. If a student has an excused absence, death or illness in the immediate family, the student must notify the instructor of record immediately. If a test is missed, the instructor has to give permission for make up. The missed test must be made up before the next scheduled period of instruction.

An excused absence only allows for make up of missed assignments or test. The absence is recorded.

Assignments are due at the beginning of class of the set due date. Late assignments will not be accepted and a grade of “zero” will be earned for said assignment. Students that have notified the instructor prior to the absence may be considered excused.

## ***Pop tests***

**Can be given at any time by the instructor and are not make up items.**

## ***Exemptions***

Students can be exempted from a final exam if:

- A. Lecture average is 90 or above
- B. Attendance is perfect
- C. Assignments are completed and turned in
- D. Projects are complete

## ***Cell Phone Policy***

Cell phones may not be used in the classroom or lab as they are unsafe and disruptive to the environment.

Anyone failing to adhere to this policy will be dismissed from class and issued a non-participation grade (absence) for that period of instruction.

## ***Departmental Awards Ceremony/Cleanup Policy***

Each student is expected to participate in the awards ceremony and cleanup activities once the date has been identified.

Students with unexpected circumstances can be excused by the department chair only.

TSTC school calendar identifies the end of the semester. Student break begins the day after