



**Course Syllabus
SEMESTER
School of STEM**

Program Name: Transportation Technologies

Course Name: Wheel Alignment & Suspensions

Course Number: AUT 214

Credits: 3

Contact Hours: 1 Lecture 6 Lab

Instructor's Name:

Office Hours & Location:

Campus Phone:

Campus E-mail:

Additional Contact Information:

Catalog Description: Wheel alignment, wheel balancing and front and rear suspensions are studied. Steering gears, rack and pinion steering, spring suspension and MacPherson struts also are discussed.

Prerequisites/Co-Requisites: AUT 110

Lab Fees: COST

Current Textbooks, Materials, Equipment (software/hardware requirements):

General Information

For information on FERPA, Cheating and Plagiarism, Assessment of Student Learning Outcomes and Student Code of Conduct, please refer to the appropriate section of the current Owens Community College Catalog online.

TOOL ROOM

The Transportation Technologies uses a central tool room to supply students with the tools needed during their lab time on campus. The students will be required to have an Owens student ID to acquire the tools. The student who signed out the tools is responsible for those tools and will be charged the replacement cost if they are lost or misplaced. Check with the tool room attendant regularly to make sure your account is cleared.

Course Outcomes:

The student given the vehicle or component and the tools and equipment will, with at least 90% accuracy:

1. Identify and explain the operation of front and rear suspension components.
2. Align the wheels on a modern automobile.
3. Identify and explain the operation of steering linkage components.
4. Identify and explain the operation of steering gear components.
5. Demonstrate correct shop safety & maintenance.

Student Learning Outcomes:

Throughout the term of this course, students will perform or have demonstrated to them the following tasks. All tasks must be performed according to manufacturer instruction/requirements, any deviation must be approved by the instructor prior to the next step.

1. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.
2. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action.
3. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action.
4. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.
5. Adjust manual or power non-rack and pinion worm bearing preload and sector lash.
6. Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets.
7. Disassemble, inspect, perform necessary action and reassemble rack and pinion steering gear.
8. Adjust manual or power rack and pinion steering gear.
9. Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.
10. Inspect power steering fluid levels and condition.
11. Flush, fill, and bleed power steering system.
12. Diagnose power steering fluid leakage; determine necessary action.
13. Remove, inspect, replace, and adjust power steering pump belt.
14. Remove, inspect, and replace power steering pumps.
15. Remove, inspect, and replace power steering pump pulley; check alignment.
16. Inspect and replace power steering hoses and fittings.
17. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
18. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
19. Diagnose and adjust components of electronically controlled steering systems; determine necessary action.
20. Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action.
21. Diagnose MacPherson strut suspension system noises, body sway, and uneven riding height concerns; determine necessary action.

22. Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers.
23. Remove, inspect, install, and adjust strut (compression/tension) rods and bushings.
24. Remove, inspect, and install upper and lower ball joints on short and long arm suspension systems.
25. Remove, inspect, and install steering knuckle assemblies.
26. Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.
27. Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts.
28. Remove, inspect, and install stabilizer bar bushings, brackets, and links.
29. Remove, inspect, and install MacPherson strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
30. Remove, inspect, and install coil springs and spring insulators.
31. Remove, inspect, and install transverse links, control arms, bushings, and mounts.
32. Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts.
33. Remove, inspect, and install MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers).
34. Inspect, remove, and replace shock absorbers.
35. Remove, inspect, and service or replace front and rear wheel bearings.
36. Diagnose, inspect, adjust, repair or replace components of electronically controlled suspension systems.
37. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
38. Perform prealignment inspection; perform necessary action.
39. Measure vehicle riding height; determine necessary action.
40. Check and adjust front and rear wheel camber; perform necessary action.
41. Check and adjust caster; perform necessary action.
42. Check and adjust front wheel toe; adjust as needed.
43. Center steering wheel.
44. Check toe-out-on-turns (turning radius); determine necessary action.
45. Check SAI (steering axis inclination) and included angle; determine necessary action.
46. Check and adjust rear wheel toe.
47. Check rear wheel thrust angle; determine necessary action.
48. Check for front wheel setback; determine necessary action.
49. Check front cradle (subframe) alignment; determine necessary action.
50. Diagnose tire wear patterns; determine necessary action.
51. Inspect tires; check and adjust air pressure.
52. Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
53. Rotate tires according to manufacturer's recommendations.
54. Measure wheel, tire, axle, and hub runout; determine necessary action.
55. Diagnose tire pull (lead) problem; determine necessary action.
56. Balance wheel and tire assembly (static and dynamic).
57. Dismount, inspect, repair, and remount tire on wheel.

58. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.
59. Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust wheel bearings.
60. Replace wheel bearing and race.
61. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
62. Identify and interpret suspension and steering system concerns; determine necessary action.
63. Inspect, remove, and replace shock absorbers; inspect mounts and bushings.
64. Describe the function of the power steering pressure switch.
65. Reset steering angle sensor.
66. Inspect tire condition; identify tire wear patterns; check for correct tire size and application (load and speed ratings) and adjust air pressure; determine necessary action.
67. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
68. Inspect tire and wheel assembly for air loss; perform necessary action.

Grading Procedure:

GRADE COMPILATION:

Lab	60%
Quiz	30%
Final Exam	10%
Total	100%

GRADE SCALE:

94-100	A
87-93	B
78-86	C
70-77	D
0-69	F

Specific Course Rules & Classroom Procedures:

1. The student is responsible for all material discussed in class, handed out, seen or heard in visual/audio, or written on the board.
2. The student is responsible for all work assigned whether discussed in class or not.
3. Any missed classes, tests, or assignments must be made up by the end of the semester through agreement with the instructor.
4. The instructor, with permission of the chairman, whenever appropriate and necessary, reserves the right to amend, adjust, or deviate from the course outline

and lecture topic areas to assure the students of the best possible education from the course.

Safety Glasses

Students will not be permitted to attend lab classes without the required safety glasses.

Safety

Since personal safety is a major concern of both this college and employers, students will be expected to conduct themselves in a safe manner at all times. Students will be required to follow safety requirements pertaining to: safety glasses, clothing, labs, and work procedures (Remember SAFETY is everyone's job!)

- Computer Headphones are required.
ABSOLUTELY NO DOWNLOADING IN COMPUTER LAB.

Specific Course Rules: (This can include but is not limited to: policies on attendance, make-up/late work, class participation, tape recording, cell phone use, and electronic device use.)

Lab Safety Policy

Safety is very important for everyone. Safety guidelines are to be adhered to in performing all tasks.

Safety glasses must be worn at all times upon entering the lab areas. No exceptions. Proper clothing and shoes are to worn in the labs. Full-length pants, proper work short sleeve or long sleeve shirts, and appropriate industry related footwear (non-slip soles, puncture proof material, steel toe, etc.) must be worn in the lab areas. Loose clothing, scarves, ties, shorts, jewelry, etc. are not permitted while working in the labs. Long hair should be pulled up.

Hearing protection, masks, gloves, and respirators should be used when directed by your instructors.

Be aware of your surroundings and report anything potentially unsafe to your instructor or other college employee. When in doubt ask!

Religious Accommodations: A student seeking an accommodation for an absence permitted under Ohio's Testing Your Faith Act must provide the instructor with a **written email** notice with the specific dates for an absence, and must do so not later than fourteen (14) days after the first day of instruction. **Alternative accommodations are not retroactive, and no academic penalty will be imposed for an absence under the policy*.** The request for an alternative accommodation will be kept confidential. Students with questions about a religious accommodation under Ohio's Testing your Faith Act may contact the College's Office of Academic Affairs: provost@owens.edu

*The policy may be found on the Owens website: [3358:11-2-63 Accommodation](#) for a Student Absence for the Observance of Religious Beliefs and Practices Policy

Health & Safety Information: Please note that while unlikely, there is a possibility courses might need to change the delivery method due to public health concerns. If this happens, the college will communicate any changes via email and/or other communication methods.

If you are not able to come to class because you are ill, please let me know as soon as possible. When possible, class materials will be available through Blackboard (or Zoom or). I will do my best to make arrangements for you to make up the work you missed, if practicable.

Currently, masks are allowed but not required on campus; however, this requirement may change depending on circumstances. If changes are made, you will be informed via email and/or other communication methods.

Disability Resources Services: If you have a disability or acquire one, you may be entitled to receive reasonable accommodations intended to assure you an equal opportunity to participate in and benefit from the program. To receive more information or to register for accommodations, please contact the Disability Resource Center in College Hall 116 at 567-661-7007 or email disability@owens.edu.

Classroom Admittance

OCC classes (e.g., traditional, land-based, laboratory, hybrid, asynchronous, online, synchronous online, etc.) shall only be attended by the officially registered OCC students, instructor of record, guest lecturer, or substitute. Visitors are not permitted in the classroom and should not be invited to attend or participate in the class. See FERPA for specifics.

<https://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html>

Smoke/Tobacco Free Campus. As of January 1, 2016, Owens Community College is a smoke and tobacco-free campus. Smoking and the use of tobacco products are prohibited in any College building, College vehicle or on College grounds or property owned or controlled by the College.

Student Code of Conduct:

All students are expected to follow Owens Community College's Student Code of Conduct. If you are unfamiliar with the code, it can be found at https://www.owens.edu/student_services/code_conduct.html

Anti-Discrimination and Harassment & Title IX/Sexual Misconduct:

All students, faculty, and staff are expected to follow Owens Community College's Anti-Discrimination and Harassment Policy and the College's Title IX/Sexual Misconduct Procedures and Guidelines. The College strictly prohibits and will not tolerate harassment, discrimination, intimidation, or hostile/offensive working or learning environments.

If you are unfamiliar with the Anti-Discrimination and Harassment Policy, it can be found at: <https://www.owens.edu/trustees/procedures/proc3358-11-4-17.pdf>
If you are unfamiliar with the Title IX/Sexual Misconduct Procedures and Guidelines, it can be found at: <https://www.owens.edu/trustees/procedures/proc3358-11-4-17-titleIX.pdf>

Resources: (This can include but is not limited to: Testing Center, Writing Center, Math Lab, Science Center, Library.)

Miscellaneous Information:

Disclaimer: “The instructor reserves the right to amend this syllabus as deemed necessary and will communicate such amendment to the students in the course.”