**Syllabus – AUSV 1025 – Fall Semester 2014**

**Weber State University – Automotive Technology Department**

**Steering and Suspension Systems Part 2**

**(2 credit hours)**

**Course Description:**

This course covers the theory of operation, diagnosis, and repair of steering and suspension systems. This is part 2 of a two-part course. Each part is two credit hours for a total of four credit hours.

**Prerequisite**

1. The WSU Shop Safety Module [www.weber.edu/automotive](http://www.weber.edu/automotive)
2. Completion of the two required S/P2 certifications [www.sp2.org](http://www.sp2.org/)
3. AUSV 1000 – Introduction to Automotive Service

**Communication Policy**:

* When necessary, the professor will contact the students through text messaging or their WSU wildcat email address (unless you provide a different preferred email address in your online preferences).  Students should check their email a few times per week; this is especially important on the weekends and before driving to class.
* Text messaging, phone calls, and surfing the Internet during class is unprofessional, distracting, and is prohibited.  Many employers do not allow cell phone use during normal work hours.  Please silence all cell phones and audible “silent” vibrations.  Communication with the instructor via phone, email, and text messaging is allowed until 6:00 p.m. (please include your name). Unwanted phone calls and/or text messaging is considered harassment and is against the law.

**Behavioral Expectations and skills**

According to the WSU Automotive Department National Advisory Committee recommendations, all students are expected to have the following behavioral traits:

1. Integrity - Behaves with honor and dignity; does the right thing.
2. Reliability - Sticks with it to get the job done
3. Trustworthy and Honest - Holds self and others to highest standards
4. Passion for Excellence
5. Initiative - Thinks outside the box
6. Innovation and Technical Excellence - Discovers better ideas and applies expertise
7. Commitment to Quality
8. Courage - Fights to turn dreams into realities
9. Community Commitment - Acts to enhance the community
10. Conduct – Follow the WSU student code of conduct:

**All students are expected to have the following skills:**

1. Be self-motivated enough to be able to plan, organize and prioritize time and workload in order to accomplish tasks and meet deadlines.
2. Develop and safeguard professional relationships; demonstrate interpersonal networking skills
3. Demonstrate computer information literacy (including: email, typing, Internet navigation, Microsoft Office Professional (Access, Excel, Word, PowerPoint))
4. Demonstrate analytical skills
5. Work with or contribute to a work group or team to complete assigned task(s)
6. Communicate in professional written form
7. Compose and produce technical reports, documents and related material present technical information in a professional manner to a variety of audiences
8. Monitor or track information or data
9. Evaluate information against a set of standards
10. Weigh the relative costs and benefits of a potential action and make a decision; acumen (good judgment).

**Contact Information:**

* Professor:
* Office:
* Office Hours:
* Office Phone:
* Cell Phone:
* Fax:
* E-mail:
* Facebook: [www.facebook.com/weberauto](http://www.facebook.com/weberauto)
* YouTube: [www.youtube.com/weberauto](http://www.youtube.com/weberauto)

**Class Time and Location:**

* Room
* Class Dates:

**Required Materials:**

* Text Book - TBD
	+ A WSU Student Photo ID Card. – This is required to check out tools or equipment from the tool room.
	+ Basic hand tool set.
	+ Access to Internet to access web-based training.
* Safety goggles/glasses.  These must be worn in the shop at all times.

**Learning Outcomes (NATEF Tasks):**

The Automotive Technology program at Weber State University is accredited by the [National Automotive Technicians Education Foundation](http://www.natef.org/) (NATEF).  To obtain NATEF accreditation, certain [tasks](http://www.natef.org/program_standards/auto/task_list.cfm) must be taught or performed in each of the eight Automotive Service Excellence ([ASE](http://www.ase.com/)) areas.

The course covers about half of the NATEF Master Automotive Service Technician (MAST) tasks from area A4 – Steering and Suspension Systems. Approximately half of the following tasks are covered in the part 1 class; the remainder will be covered in the parts 2 class. For concurrent enrollment classes, determination of task coverage for part 1 must be made in cooperation with the high school instructors and the WSU automotive department.

**IV. SUSPENSION AND STEERING**

**A. General: Suspension and Steering Systems**

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
2. Identify and interpret suspension and steering system concerns; determine necessary action.

**B. Steering Systems Diagnosis and Repair**

1. Disable and enable supplemental restraint system (SRS).
2. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).
3. Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action.
4. Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.
5. Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and noise concerns; determine necessary action.
6. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action.
7. Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.
8. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed.
9. Determine proper power steering fluid type; inspect fluid level and condition.
10. Flush, fill, and bleed power steering system.
11. Inspect for power steering fluid leakage; determine necessary action.
12. Remove, inspect, replace, and adjust power steering pump drive belt.
13. Remove and reinstall power steering pump.
14. Remove and reinstall press fit power steering pump pulley; check pulley and belt alignment.
15. Inspect and replace power steering hoses and fittings.
16. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.
17. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
18. Test and diagnose components of electronically-controlled steering systems using a scan tool; determine necessary action.
19. Identify hybrid vehicle power steering system electrical circuits and safety precautions.
20. Inspect electric power-assisted steering.

**IV. SUSPENSION AND STEERING**

**C. Suspension Systems Diagnosis and Repair**

1. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
2. Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action.
3. Inspect, remove and install upper and lower control arms, bushings, shafts, and rebound bumpers.
4. Inspect, remove and install strut rods and bushings.
5. Inspect, remove and install upper and/or lower ball joints (with or without wear indicators).
6. Inspect, remove and install steering knuckle assemblies.
7. Inspect, remove and install short and long arm suspension system coil springs and spring insulators.
8. Inspect, remove and install torsion bars and mounts
9. Inspect, remove and install front stabilizer bar (sway bar) bushings, brackets, and links.
10. Inspect, remove and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.
11. Inspect, remove and install track bar, strut rods/radius arms, and related mounts and bushings.
12. Inspect rear suspension system leaf spring(s), bushings, center pins/bolts, and mounts.

**D. Related Suspension and Steering Service**

1. Inspect, remove, and replace shock absorbers; inspect mounts and bushings.
2. Remove, inspect, and service or replace front and rear wheel bearings.
3. Describe the function of the power steering pressure switch.

**E. Wheel Alignment Diagnosis, Adjustment, and Repair**

1. Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action.
2. Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.
3. Prepare vehicle for wheel alignment on alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber and toe as required; center steering wheel.
4. Check toe-out-on-turns (turning radius); determine necessary action.
5. Check SAI (steering axis inclination) and included angle; determine necessary action.
6. Check rear wheel thrust angle; determine necessary action.
7. Check for front wheel setback; determine necessary action.
8. Check front and/or rear cradle (sub-frame) alignment; determine necessary action.
9. Reset steering angle sensor

**F. Wheels and Tires Diagnosis and Repair**

1. 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.
2. Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.
3. Rotate tires according to manufacturer’s recommendations.
4. Measure wheel, tire, axle flange, and hub runout; determine necessary action.
5. Diagnose tire pull problems; determine necessary action.
6. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).
7. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.
8. Inspect tire and wheel assembly for air loss; perform necessary action.
9. Repair tire using internal patch.
10. Identify and test tire pressure-monitoring system (indirect and direct) for operation; calibrate system; verify operation of instrument panel lamps.
11. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.

**Safety Information:**

The Weber State University (WSU) Automotive Department has made student safety a top priority.  WSU has made every effort to comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Every automotive student is required to complete a shop safety module and two certifications from the Safety and Pollution Prevention (S/P2) website.  These requirements insure that our students have been exposed to local, state, and federal safety and environmental regulations.

**Grading Criteria:**

The following criteria will determine your grade

* Compliance with safety regulations including wearing eye protection during lab assignments (5%)
* Lab assignments and worksheets (40%)
* Completion of required web-based Training (15%)
* Class participation and reading assignments (10%)
* Chapter quizzes (10%)
* Hands-on final exam (20%)

Letter grades are determined by the percentage of possible points accumulated.

* A = 95% - 100%
* A- = 90% - 94%
* B+ = 87% - 89%
* B = 84% - 86%
* B- = 77% - 83%
* C+ = 74% - 76%
* C = 70% - 73%
* C- = 67% - 69% (You must have a grade of C or higher to count towards graduation)
* D+ = 64% - 66%
* D = 60% - 63%
* D- = 57% - 59%
* E = Below 57%

**Policies:**

1. Safety glasses/goggles must be worn in the shop at all times.
2. While working in the shop, proper attire must be worn.  This applies, but is not limited, to:
3. Uniforms/clothing
4. Shoes
5. Jewelry
6. Proper hair restraint
7. A student WSU ID card is required to check out tools from the tool room.
8. Respect:
	1. Customer’s vehicles by using seat and fender covers
	2. Other students and their learning experience
	3. WSU tools and vehicles by identifying problems with tools and vehicles when found.
	4. Class is not over until all tools are put away and everything is clean and organized.
9. Attendance is required every day.  Each day’s topics build on the previous day’s topics.  If you must miss a day of class your grade will suffer. Please make arrangements to obtain the reading assignment and homework from the Professor of you must miss class.
10. Late work will NOT be accepted unless arrangements are made ahead of time with the Professor.  The maximum credit allowed for late work is 50%.
11. All of your assignments must be completed and submitted online by their posted dates at 11:59 p.m. The use of cell phones during class is prohibited except in an emergency.  Text messaging is always prohibited.
12. All of your assignments must be completed on the day assigned.  Class will follow the sequence listed in the schedule.
13. Unless you are assigned to work in groups for lab work, you must do your own work.  Collaboration with other students is not allowed.
14. Dishonesty will not be tolerated and will result in a score of zero for the assignment, quiz, or exam.

**Recommendations to get the most from this course:**

1. Be early or on time.  Class will begin without you.
2. Ask questions to clarify points that you do not understand.
3. Follow directions as they are given to you.

**Services for Students with Disabilities:**

"Any student requiring accommodations or services due to a disability must contact Services for Students with Disabilities (SSD) in room 181 of the Student Services Center. SSD can also arrange to provide course materials (including the syllabus) in alternative formats if necessary."

For more information about the SSD contact them at 801-626-6413, ssd@weber.edu, or <http://departments.weber.edu/ssd/>.

**Course Schedule:**

* **TBD**