**Syllabus – AUSV 1124 – Fall Semester 2014**

**Weber State University – Automotive Technology Department**

**Engine Mechanical Part 2**

**(2 credit hours)**

**Course Description:**

This course covers the theory of operation, diagnosis, and repair of engine mechanical. 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 A1 – Engine Repair. 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.

**I. ENGINE REPAIR**

**A. General: Engine Diagnosis; Removal and Reinstallation (R & R)**

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
2. Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins.
3. Verify operation of the instrument panel engine warning indicators.
4. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.
5. Install engine covers using gaskets, seals, and sealers as required.
6. Remove and replace timing belt; verify correct camshaft timing.
7. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.
8. Inspect, remove and replace engine mounts.
9. Identify hybrid vehicle internal combustion engine service precautions.
10. Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition.

**B. Cylinder Head and Valve Train Diagnosis and Repair**

1. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer’s specifications and procedures.
2. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition.
3. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action.
4. Adjust valves (mechanical or hydraulic lifters).
5. Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing.
6. Establish camshaft position sensor indexing.
7. Inspect valve springs for squareness and free height comparison; determine necessary action.
8. Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine necessary action.
9. Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action.
10. Inspect valves and valve seats; determine necessary action.
11. Check valve spring assembled height and valve stem height; determine necessary action.
12. Inspect valve lifters; determine necessary action.
13. Inspect and/or measure camshaft for runout, journal wear and lobe wear.
14. Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine necessary action.

**C. Engine Block Assembly Diagnosis and Repair**

1. Remove, inspect, or replace crankshaft vibration damper (harmonic balancer).
2. Disassemble engine block; clean and prepare components for inspection and reassembly.
3. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action.
4. Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action.
5. Deglaze and clean cylinder walls.
6. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action.
7. Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine necessary action.
8. Inspect main and connecting rod bearings for damage and wear; determine necessary action.
9. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine necessary action.
10. Inspect and measure piston skirts and ring lands; determine necessary action.
11. Determine piston-to-bore clearance.
12. Inspect, measure, and install piston rings.
13. Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance or silencer); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.
14. Assemble engine block.

**I. ENGINE REPAIR**

**D. Lubrication and Cooling Systems Diagnosis and Repair**

1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core and galley plugs; determine necessary action.
2. Identify causes of engine overheating.
3. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.
4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.
5. Inspect, remove, and replace water pump.
6. Remove and replace radiator.
7. Remove, inspect, and replace thermostat and gasket/seal.
8. Inspect and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
9. Perform oil pressure tests; determine necessary action.
10. Perform engine oil and filter change.
11. Inspect auxiliary coolers; determine necessary action.
12. Inspect, test, and replace oil temperature and pressure switches and sensors.
13. Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.

**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**