



SYLLABUS

Your Course Learning Plan

Engine Theory

85302AA

UAWLETC

A. General Course Information

Course description: The Engine Theory students of UAW-LETC will satisfactorily complete a series of activities that will meet the needs of Automotive Dealerships while following guidelines of the National Automotive Training and Education Foundation (NATEF). These activities will consist of, but not limited to; diagnostics, repair and/or replacement, and adjustment to factory specifications. These activities will take place in the classroom and shop, consisting of written and hands-on exercises. Each phase will have its guidelines and time period. We will cover some areas with more detail than other's depending on the industry demand for that area.

Prerequisites: Technical Introduction to Dealerships: Module 4 Engines and Components. *(Refer to TID Curriculum for more information)*

Organization: This is a lecture / shop course in which topics are presented by the instructor, shop assignments are explained and assigned projects are completed by students both during class and shop time. Objective quizzes are given at the completion of each section and there is a comprehensive final exam. When students have completed this course they generally have the same level of expertise as those who have experience in the automotive industry. Initial emphases are on the use of equipment and fundamental procedures.

Course objectives:

1. Demonstrate the skill to disassemble an engine.
2. Demonstrate the skill to inspect and measure engine components.
3. Demonstrate the skill to reassemble an engine.
4. Demonstrate the skill to diagnose and repair internal engine failures.

Textbooks / Software:

1. Automotive Encyclopedia.
2. Video Library.

B. Course Content and Outcomes

Course content:

1. Engine Design and Construction
2. Fundamental Engine Operation
3. Cleaning the Engine
4. Engine Lubrication System
5. Basic Engine Cooling System Operation
6. Engine Cooling System Diagnosis
7. Fasteners and Thread Repair
8. Engine Sealing: Gaskets, Seals, and Sealing Surfaces
9. Special Tools and Precision Measurements

10. Engine Disassembly
11. Cylinder Block Service
12. Pistons, Rings, and Connecting Rods
13. Crankshaft Design and Service
14. Cylinder Head Service
15. Basic Engine Diagnosis

Learning outcomes:

Upon successful completion of this course the student will:

1. Implement a diagnostic strategy that will aid in identification and location of Failures in Engine mechanical components.
2. Demonstrate knowledge of engine construction and operation
3. Possess the skills necessary to perform Engine teardown and assembly in line with the highest quality standards in the automotive industry.

Grading (credit) criteria:

Course will be weighted as follows. Task Tasksheets 40%, Quizzes 30%, homework i0%, and Final exam 20%.

Task tasksheets will be assigned almost every day. Tasksheets will be due at the end of each day. Grading will be based on a performance rating of "2" (Proficient) and "3" (Proficient, able to teach others) with a minimum rating of "2" being required for passing. (Extra credit will be given for a rating of"3").

There will be many objective quizzes given relating to current topics. Grading will be based on percentage of correctly answered questions. A grade of 80% is required for passing.

The final exam will be comprehensive relating to all topics covered in the course. Questions are written with heavy emphasis on critical thinking and diagnostic skills. A grade of 80% is required for passing.

C. Class/Shop Policies

Student Expectations:

1. Be on time for the start of class and return to class for final roll call.
2. Wear safety glasses in the shop at all times.
3. Appropriate working attire shall be worn.
4. Access to shop vehicles only as authorized by the instructor.
5. No cell phones or other electronic devices
6. Participate in classroom discussions.
7. Observe classroom etiquette.
8. Participate in shop clean up.
9. Attendance to shop activities in assigned area.
10. Approval by instructor required prior to being absent from assigned area.
11. Clean all tools prior to returning them to the tool crib.
12. Follow all safety rules; be concerned with your safety and the safety of others.
13. Report all injuries regardless of the nature or severity to the instructor.

D. Other resources

Online resources:

Techinfo.Toyota.Com

Tentative Schedule

DAY	TASK	TOPIC/ACTIVITY
1		<p>Engine Design and Construction</p> <p>Quiz: Components and Nomenclature</p>
2		<p>Fundamental Engine Operation</p> <p>Engine Cycles Engine Types</p> <p>Quiz: Basic Engine Operation</p> <p>Text: Automotive Engines Textbook, Chapter 1, Engine Operation, pages 3-21</p>
3		<p>Fundamental Engine Operation (cont.)</p> <p>The Combustion Process</p> <p>Quiz: The Combustion Process</p> <p>Text: Automotive Engine Performance, Chapter 32, Introduction to Air Quality & Emissions Control Systems, pages 321-327. Article: What Does Octane Mean</p>
4		<p>Cleaning the Engine</p> <p>Quiz: Cleaning the Engine</p> <p>Text: Automotive Engines Textbook, Chapter 2, Cleaning the Engine, pages 22-45.</p>
5		<p>Engine Lubrication System</p> <p>Lubrication Producing Oil Pressure</p> <p>Quiz: Lubrication Systems</p> <p>Text: Automotive Engines Textbook, Chapter 13, Lubrication, pages 392-413. Article: Crankshaft and Bearings</p>
6		<p>Basic Engine Cooling System Operation</p> <p>Text: Automotive Engines Textbook, Chapter 14, Cooling System, pages 414-438. Article: Overheating: Causes and Cures</p>
7		<p>Engine Cooling System Diagnosis</p> <p>Quiz: Engine Cooling System</p> <p>Text: Automotive Engines Textbook, Chapter 14, Cooling System, pages 414-438 Article: Overheating: Causes and Cures</p>
8	Worksheet A099, Broken Bolt Removal and Threaded Insert Installation	<p>Fasteners and Thread Repair</p> <p>Thread Repair Broken Fastener Removal</p> <p>Text: Automotive Engines Textbook, Chapter 15, Engine Hardware: Fasteners, Thread Repair, and Gaskets, pages 441-480</p>

9		<p>Engine Sealing: Gaskets, Seals, and Sealing Surfaces Definition of Gaskets, Seals, and Applications Sealing Surfaces Service Procedures and Diagnosis</p> <p>Quiz: Fasteners, Thread Repair, and Gaskets</p> <p>Text: Automotive Engines Textbook, Chapter 15, Engine Hardware: Fasteners, Thread Repair and Gaskets, pages 441-480.</p>
10	Worksheet A098, Precision Measurements	<p>Special Tools and Precision Measurements Engine Building Tools and Proper Usage Precision Measuring</p> <p>Quiz: Precision Measurements</p> <p>Text: Automotive Engines Textbook, Chapter 4, Measuring, pages 95-108</p>
11		<p>Engine Disassembly Basic Engine Removal Procedures Engine Disassembly Procedures</p> <p>Text: Automotive Engines Textbook, Chapter 6, Engine Removal, Disassembly, Inspection, and in-car Repairs, pages 146-187.</p>
12	Worksheet A100, Visual Inspection of Cylinder Walls Tasksheet A101, Block Deck Warpage Testing	<p>Cylinder Block Service Basic Components Basic Service Procedures</p> <p>Text: Automotive Engines Textbook, Chapter 10, Cylinder Block-Inspection and Service, pages 303-329.</p>
13	Worksheet A121, Freeze Plug Removal and Installation	<p>Cylinder Block Service (cont'd) Cylinder Bore Service Procedures Core Plug Installation Final Block Preparation Various Block Measurements</p> <p>Text: Automotive Engines Textbook, Chapter 10, Cylinder Block-Inspection and Service, pages 303-329</p>
14	Worksheet A110, Piston and Ring Removal and Measurement Worksheet A120, Cylinder Bore Measurement	<p>Pistons, Rings, and Connecting Rods Piston, Rings, and Connecting Rod Purposes and Functions Service Procedures Failure Issues and Diagnosis</p> <p>Text: Automotive Engines Textbook, Chapter 12, Pistons, Rings, and Connecting Rods, pages 358-391.</p>
15,16	Worksheet A130, Crankshaft Removal, Measurement, and Installation Worksheet A131, Crankshaft and End Play Measurement Worksheet A140, Ring and Piston Installation	<p>Crankshaft Design and Service Design Features Service Procedures Possible Problems/Failures</p> <p>Text: Automotive Engines Textbook, Chapter 11, Crankshaft, Bearings, and Engine Balancing, pages 330-357</p>

17	Worksheet A160, Cylinder Head Removal Worksheet A161, Cylinder Head Warpage Testing Worksheet A162, Cylinder Head Disassembly	Cylinder Head Service Cylinder Head Design and Operation Cylinder Head Removal Cylinder Head Disassembly Text: Automotive Engines Textbook, Chapter 7, Cylinder Head: Parts and Service, pages 191-223.
18	Worksheet A163, Valve Spring Squareness, Free Length and Pressure Measurements Worksheet A164, Rockers, Pushrods and Lifter Inspection	Cylinder Head Service (cont'd) Valvetrain Component Inspection Text: Automotive Engines Textbook, Chapter 8, Cylinder Head: Springs, Valves, and Valve Seats, pages 224-254.
19	Worksheet A165, Valve Stem-to-Guide Measurement Worksheet A166, Valve Face-to-Seat Contact Measurement Worksheet A167, Cylinder Head Reassembly	Cylinder Head Service (cont.) Valve Seat and Guide Service Text: Automotive Engines Textbook, Chapter 8, Cylinder Head: Springs, Valves, and Valve Seats, pages 224-254.
20	Worksheet, A170, Cylinder Head Installation	Cylinder Head Service (cont.) Install Cylinder Head Text: Automotive Engines Textbook, Chapter 16, Reassembly and Starting, pages 481-508
21	Worksheet A180, Valve Stem Seal Replacement on an Assembled Engine Worksheet A181, Valve Clearance Measurement and Adjustment	Cylinder Head Service (cont.) Replace Valve Stem Seals on an Assembled Engine Measuring and Adjusting Valve Lash Text: Automotive Engines Textbook, Chapter 9, Engine Breathing and Power: Cam, Manifolds, and Turbochargers, pages 255-300.
22, 23		Basic Engine Diagnosis Noise and Vibration Causes, Concerns, and Corrections Quiz: Noise and Vibration Text: Automotive Engines Textbook, Chapter 5, Preliminary Diagnosis Before Repair, pages 129-136 Article: Torsional Dampers
24, 25		Review Review all topics covered Text: Automotive Engines Textbook
26		Final Examination Final Examination