SOUTHWEST TECH
SOUTHWEST TECHNICAL COLLEGE

TEAU 1800 - Engine Performance I (4 Credits)

Course Description

The Engine Performance I course provides theory and hands-on instruction in automotive engine performance while following the program standards set forth by Automotive Service Excellence Education Foundation at the master level.

Course Objectives

- Maintain vehicle safety through safe engine performance maintenance and repairs.
- Identify and interpret engine performance concerns; determine needed action.
- Inspect and repair abnormal engine noises or vibration concerns; determine needed action.
- Inspect and repair automotive ignition systems; determine needed action.
- Inspect and repair automotive fuel systems; determine needed action.
- Inspect and repair automotive air induction systems as it relates to engine performance.
- Inspect and repair automotive exhaust systems as it relates to engine performance.

Course Outline

- Overview of Engine Performance and Basic Theories
- Electricity and Electronics
- Intake and Exhaust Systems
- Input Sensors
- Fuel Systems and Fuel Injection Operation
- Ignition Systems
- Emission Control, Computer Outputs, and Networks
- On-Board Diagnostics and Related Systems

Textbook & Reading Materials

Cengage Unlimited (1 year subscription), Cengage

Assignments and Assessments

Orientation
Orientation Acknowledgement
Engine Performance I Syllabus 2021-22
Remind Txt Group
Automotive Student OE Inst ructions
Right to Know and Safety Agreememt
Student Information Sheet
COVID-19 Policies and Procedures Agreement review
Engine Performance I Lab Assignme1nt Checklist Review
Simulation Instructions for Cengage Mindtap
Cleaning Expectations
Southwest Technical College Automotive Video Playlist
Student Tool and Equipment Use Waiver
Cell Phone
Instructions
Digital Lab Explanation
Module Breakdown
Module 1 Labs
Module 2 Labs
Module 3 Labs
Module 4 Labs
Module 5 Labs
Module 6 Labs
Module 7 Labs
Module 8 Labs
Cleaning Labs
Cleaning Lab 1
Cleaning Lab 2
Cleaning Lab 3
Cleaning Lab 4
Cleaning Lab 5
Chapter 01 Reading: Classroom
Principles of Ignition Systems
Starting Systems
Chapter 1 Multiple Choice and Tr,ue-False Quiz
Chapter 1 Fill in the Blank Questions
Chapter 1 Labeling Activity 1 (4 Stroke Cycle)
Chapter 1 Labeling Activity 2 (Ignition System Basics)
Chapter 1 Multiple Choice and True-False Quiz
Chapter 01 Reading: Shop
Chapter la SM Video Questions (Related Careers)
Chapter lb SM Video Questions (Hybrid Safety)
Chapter 1 ASE-Style Review Questions
Chapter 02 Reading: Classroom
Using a Scan Tool
Testing BCM Power and Ground Circuits
Flashing the BCM
Principles of Pressure Versus Vacuum
Chapter 2 Multiple Choice and True-False Quiz
Chapter 2 Fill in the Blank Questions
Chapter 2 CM Video Questions (Gear Ratios)
Chapter 02 Reading: Shop
Use a Feeler Gauge
Measurement Systems
Chapter 2 ASE-Style Review Questions
Photo Sequence 1: Typical Technician Workflow
Chapter 2 SM Video Questions (Measuring Systems)
Performing a Vacuum Test
Performing a Power Balance Test Using a Scan Tool
Performing a Cranking Compressfon Test
Performing a Running Compression Test
Cooling System Inspection and Testing
Oil Pressure Testing
Cylinder Head Designs
Engine Valve Train
Construction and Purpose of the Engine Block
Chapter 3 Fill in the Blank Questions
Chapter 3 Multiple Choice and True-False Quiz
Chapter 3 Labeling Activity
Chapter 3 CM Video Questions
Chapter 03 Reading: Shop
Compression Testing
Using a Vacuum Gauge
Chapter 3 ASE-Style Review Questions
Chapter 3 ASE Challenge Questions
Photo Sequence 4: Conducting a Cylinder Compression Test
Chapter 3 SM Video Questions
EP-1 Iderntify and interpret engine performance concerns
EP-2 Research applicable vehicle and service information and Technical Service Bulletins
EP-3 Engine Manifold Vacuum Test
EP-4 Engine Manifold Vacuum Test
EP-5 Compression test
EP-6 Perform cylinder compression test
EP-7 Cylinder Leakage Test
EP-8 Retrieve and Record Codes from the OBD1 Control System
EP-9 Retrieve and record codes OBD 11
EP-10 Distributor cap and rotor inspection
EP-11 Adjust engine valves
Checkpoint Meeting Module 1
Chapter 04 Reading: Classroom
Chapter 4 Multiple Choice and True-False Quiz
Chapter 4 Fill in the Blank Questions
Chapter 4a CM Video Questions (Ohm's Law)
Chapter 4b CM Video Questions (Battery, Fuses, Basic electrical components)
Reading Wiring Diagrams
Chapter 04 Reading: Shop
Chapter 4 ASE-Style Review Questions
Chapter 4 ASE Challenge Questions
Chapter 4 SM Video Questions (Schematics)
Using the Voltmeter
Voltage Drop Testing
Using the Lab Scope
Photo Sequence 5: Performing a Volltage Drop Test

EP•12 Research vehicle service information
EP-13 Diagnose engine problem w/oscilloscope
EP-14 Basic use of a Digital Multimeter (DMM)
EP-15 Inspect, test and replace ignition module
EP-16 Test and service fuel pumps
Checkpoint Meeting Module 2
Chapter 05 Reading: Classroom
Catalytic Converter Animation
Catalytic Converter Deconstructed
Function and Operation of Engine's Air Intake System
Chapter 5 Multiple Choice and True-False Quiz
Chapter 5 Fill in the Blank Questions
Chapter 5 Labeling Activity 1 (Intake Ducting)
Chapter 5 Labeling Activity 2 (Supercharger Ducting)
Chapter 05 Reading: Shop
Chapter 5 ASE-Style Review Questions
Chapter 5 ASE Challenge Questions
Photo Sequence 8: Smoke Testing
EP-17 Diagnose abnormal exhaust color
EP-18 Engine manifold vacuum test
EP-19 Engine manifold vacuum test
EP-20 Diagnose driveability and emissions
EP-21 Inspect, service, or replace air filters
EP-22 Test and service idle speed cont rols
EP-23 Inspect condition of exhaust system
Checkpoint Meeting Module 3
Chapter 06 Reading: Classroom
Chapter 6 Fill in the Blank Questions
Chapter 6 Labeling Activity (Magnetic Pulse Generator)
Hall Effect Switch
Oxygen Sensor
Closed Loop
Chapter 6 Multiple Choice and True-False Quiz
Chapter 6 Labeling Activity
Chapter 06 Reading: Shop
Chapter 6 ASE-Style Review Questions
Chapter 6 ASE Challenge Questions
Chapter 6 SM Video Questions (Engine Pert DTC)
Voltage Drop Testing
EP-24 Verify engine operating temp
EP-25 Cooling system test
EP-26 Verify camshaft timing
EP-27 Checking common sensors
EP-28 Inspect and test crankshaft and camshaft
EP-29 Fuel pressure test "fuel injected"
Checkpoint Meeting Module 4
Chapter 07 Reading: Classroom
Chapter 7 Fill in the Blank Questions
Fuel Pump Testing
Construction and Placement of Fuel Lines
Replace a Gasoline Engine Fuel Filter
Types of Alternative Fuels
Chapter 7 Labeling Activity (Hybrid components)
Chapter 07 Reading: Shop
Chapter 7 ASE-Style Review Questions
Chapter 7 ASE Challenge Questions
Chapter 7 SM Video Questions (Fuel Alcohol)
Photo Sequence 13: Typical Procedure for Relieving Fuel Pressure and Servicing the Fuel Tank
Chapter 08 Reading: Classroom
Chapter 8 Fill in the Blank Questions
Chapter 8 Multiple Choice and Tr,ue-False Quiz
Chapter 8 Labeling Activity (Direct Injection)
Chapter 8 CM Video Questions (Injection Systems)
Chapter 08 Reading: Shop
Chapter 8 ASE-Style Review Questions
Photo Sequence 16: Typical Procedure for Testing Injector Balance
Chapter 8 ASE Challenge Questions
EP-30 Replace fuel filters
EP-31 Inspect the fuel system tank lines
EP-32 Test and service fuel pumps
EP-33 Fuel pressure test "carburetor"
EP-34 Fuel oressure test "fuel iniected"
EP-35 Fuel pressure test "fuel injected"
EP-36 Overhaul carburetor "one barrel"
EP-37 Overhaul carburetor "four barrel"
EP-38 Adjust carburetor idle speed and mixture controls
Checkpoint Meeting Module 5
Chapter 09 Reading: Classroom
Testing Camshaft and Crankshaft Sensors
lgnitio:n Coil Inspection and Testing
Principles of Ignition Systems
lgnition Coil
Chapter 9 Multiple Choice and True-False Quiz
Chapter 9 Fill in the Blank Questions
Chapter 9 CM Video Questions (Timing DIS)
Chapter 09 Reading: Shop
Spark Plug Firing Voltage
Chapter 9 Labeling Activity (Hall Effect Switch)
Chapter 9 ASE-Style Review Questions
Chapter 9 ASE Challenge Questions
EP-39 Cylinder power balance test
EP-40 Compression test
EP-41 Cylinder leakage test
EP-42 Diagnose electronic ignition system
EP-43 Service secondary circuits and wiring
EP-44 Inspect, test, and service distributors
EP-45 Inspect and test secondary iginition
EP-46 Inspect and test ignition coil(s)
EP-47 Check and adjust ignition timing
EP-48 Check and adjust ignition timing
Checkpoint Meeting Module 6
Chapter 10 Reading: Classroom
Chapter 10 Labeling Activity (PCV)
Chapter 10 Fill in the Blank Questions
Chapter 10 Multiple Choice and True-False Quiz
Chapter 10 Labeling Activity (EGR system)

Chapter 10 Reading: Shop
Chapter 10 ASE-Style Review Questions
Chapter 10 ASE Challenge Questions
Photo Sequence 21: Typical Procedure for Diagnosing Knock Sensors and Knock Sensor Modules
Chapter 11 Reading: Classroom
Chapter 11 Multiple Choice and True-False Quiz
Chapter 11 CM Video Questions (Computer Networks)
Chapter 11 Fill in the Blank Questions
Chapter 11 Reading: Shop
Chapter 11 ASE-Style Review Questions
Chapter 11 ASE Challenge Questions
Photo Sequence 23: Bidirectional Control of the EVAP Purge and Vent Valves
Chapter 11 SM Video Questions (Network Communication)
EP-49 Engine manifold vacuum test
EP-S0 Verify correct camshaft timing w\OHC
EP-51 Retrieve and record codes OBD I
EP-S2 Retrieve and record codes OBD 11
EP-S3 Diagnose fuel, air induction, and exhaust
EP-S4 Remove and replace timing belt
EP-SS Diagnose emissions and driveability concern
Checkpoint Meeting Module 7
Chapter 12 Reading: Classroom
Checking for Codes and Monitor Status
Chapter 12 Multiple Choice and True-False Quiz
Chapter 12 Fill in the Blank Questions
Chapter 12 Reading: Shop
Chapter 12 ASE-Style Review Questions
Chapter 12 ASE Challenge Questions
Photo Sequence 26: Comparing 02 Signals
Photo Sequence 25: Reprogramming an OBD II PCM
Chapter 13 Reading: Classroom
Chapter 13 Multiple Choice and True-False Quiz
Chapter 13 CM Video Questions (Syncronizer)
Chapter 13 Reading: Shop
Chapter 13 ASE-Style Review Questions
Chapter 13 ASE Challenge Questions
Chapter 13 Fill in the Blank Questions
Chapter 13 SM Video Questions (Pressure Testing)
EP-S6 Diagnose engine problem
EP-S7 Diagnose engine problem w/oscilloscope
EP-S8 Verify correct camshaft timing w\OHV
EP-S9 Access and use service information
EP-60 Check and adjust ignition timing
EP-61 Interpret diagnostic trouble code
Student Feedback
End of Course Survey
Engine Performance Competency Profile 2020
Final Exam Review
Final Exam

Subject to change. Please consult your Canvas course for the most current instructions and updates.

Classroom Hours

Mo, Tu, W, Th
8:00 AM - 12:00 PM
1:00 PM - 5:00 PM

Friday
8:00 AM - 12:00 PM

For a full list of course hours visit: Course Schedule

Instructor Contact Information

Cody Dawson — cdawson@stech.edu
Shad Esplin — sesplin@stech.edu
Dallin Robinson — drobinson@stech.edu
McKael Stapel — mstapel@stech.edu

Office Hours: By appointment

Email is the preferred method of communication; you will receive a response within 24 hours during regular business hours.

Canvas Information

Canvas is the where course content, grades, and communication will reside for this course.

- stech.instructure.com
- For Canvas passwords or any other computer-related technical support contact Student Services.
- For regular Hours and Weekdays call (435) 586 - 2899.
- For after Hours & Weekends call (435) 865 - 3929 (Leave a message if no response).

Course Policies

Class attendance is required, this is not an online course. Attendance is required during your scheduled time.
Grade Scale — A: 100 - 90%, B: 89 - 80%, F: 79% or lower.
Cell phones for many have become a distraction. When you are in class or lab we encourage you to keep your cell phones put away in a secure location. If you use ear buds we ask that you only use one so you can still hear the things going on around you. If you are using your phone for things other than school related items, instructors will ask you to put them away. Please follow the direction of your instructors. Those who have been asked to refrain from using your cell phone and fail to do so will be asked to meet with the Director of Transportation and student services will be notified.
The program is designed to provide the student with as much hands-on work as possible. In the automotive industry you may be required to lift heavy objects and stand for hours at a time to complete work required. Technicians deal with chemicals and materials which require caution, these will be identified in the Right to Know Agreement provided to you. You will also be required to use computers to track and complete work.

High School Power School Grades: Quarter student grades will be determined by student progress percentage. Faculty will use the higher percentage of either 1) quarter progress, or 2) cumulative progress for the current training plan year. The progress percentage will be used with the grading scale to determine the minimum grade. High School Grade Scale: The following grading scale will be used to determine a letter grade from the progress percentage:

- A : 94 - 100%
- A- : 90 - 93%
- B+ : 87 - 89%
- B : 83 - 86%
- B- : 80 - 82%
- C+ : 77 - 79%
- C : 73 - 76%
- C- : 70 - 72%
- D+ : 67 - 69%
- D : 63 - 66%
- D- : 60 - 62%
- F : 0 - 59%

Additional Information

InformaCast Statement: Southwest Tech uses InformaCast to ensure the safety and well-being of our students. In times of emergency, such as weather closures and delays, this app allows us to promptly deliver notifications directly to your mobile devices. To stay informed and receive real-time updates, we encourage all students to sign up for notifications. Your safety is our priority, and staying connected ensures a swift response to any unforeseen circumstances. More information and directions for signing up are available at: https://stech.edu/emergency-notifications/

Internet Acceptable Use Policy: The student is expected to review and follow the Southwest Technical College Internet Safety Policy at: https://stech.edu/students/policies/

Student Code of Conduct Policy: The student is expected to review and follow the Southwest Technical College Student Code of Conduct Policy at: https://stech.edu/students/policies/

Accommodations: Students with medical, psychological, learning, or other disabilities desiring accommodations or services under ADA, must contact the Student Services Office. Student Services determines eligibility for and authorizes the provision of these accommodations and services. Students must voluntarily disclose that they have a disability, request an accommodation, and provide documentation of their disability. Students with disabilities may apply for accommodations, based on an eligible disability, through the Student Services office located at 757 W. 800 S., Cedar City, UT 84720, and by phone at (435) 586-2899. No diagnostic services are currently available through Southwest Technical College.

Safety and Building Maintenance: The College has developed and follows a variety of plans to ensure the safe and effective operation of its facilities and programs. The following plans are available online:
1) Facilities Operations and Maintenance Plan; 2) Technical Infrastructure Plan; and 3) Health and Safety Plan.

Withdrawals and Refunds: Please refer to the Southwest Technical College Refund Policy at:
https://stech.edu/students/policies/

Any high school or adult student, who declares a technical training objective is eligible for admission at Southwest Technical College (Southwest Tech). Program-specific admissions requirements may exist and will be listed on the Southwest Tech website. A high school diploma or equivalent is not required for admission but is mandatory for students seeking Title IV Federal Financial Aid.

Non-Discriminatory Policy: Southwest Technical College affirms its commitment to promote the goals of fairness and equity in all aspects of the educational enterprise, and bases its policies on the idea of global human dignity.

Southwest Tech is committed to a policy of nondiscrimination. No otherwise qualified person may be excluded from participation in or be subjected to discrimination in any course, program or activity because of race, age, color, religion, sex, pregnancy, national origin or disability. Southwest Technical College does not discriminate on the basis of sex in the education programs or activities that it operates, as required by Title IX and 34 CFR part 106. The requirement not to discriminate in education programs or activities extends to admission and employment. Inquiries about Title IX and its regulations to STECH may be referred to the Title IX Coordinator, to the Department of Education, and/or to the Office for Civil rights.

If you believe you have experienced discrimination or harassment on our campus, please contact the Title IX Coordinator, Cory Estes: cestes@stech.edu, (435) 865-3938.

For special accommodations, please contact the ADA Coordinator, Cyndie Tracy: ctracy@stech.edu, (435) 865-3944.
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