CTI Season Line-up
Technician Program

Portland, OR

Location: Portland Community College - Sylvania, Room AM207/AM208, 12000 SW 49th Ave., Portland, OR 97219

Course #	Course Name and Description	Hours	Dates
ENG-4010-4	**VARIABLE CAMSHAFT TIMING**	**4**	**10/10/2023**

With a conventional camshaft, all the variables that determine valve timing, lift, duration and overlap are cast in stone the moment the lobes are ground. Variable Camshaft Timing (VCT) or otherwise known as Variable Valve Timing (VVT) was then developed in order to achieve better overall versatility in a wider RPM range and various operating conditions by phasing the camshaft. Camshaft phasing systems allow the valve timing to be adapted to the respective operating conditions of the engine. With completion of this class technicians can expect to gain a deeper understanding of: - Camshaft foundations and the benefits of Variable Camshaft Timing (VCT) - Design and function of many modern VCT systems - Operation of various phaser styles - Special tooling requirements Variable Displacement oil pump technology - Testing of sensors, actuators and mechanical components of the VCT system - Scan tool data analysis and waveform diagnostics

Instructor: Cliff Shenkel

ENG-4011-4	**VARIABLE DISPLACEMENT CYLINDER MANAGEMENT**	**4**	**10/11/2023**

Variable Displacement Cylinder Management has become a part of many modern engine designs. Each manufacture employs cylinder displacement management using different methods, but all have the same end goal, better fuel economy and emissions. In this class the operation and troubleshooting of variable displacement cylinder management will be covered. In addition, examples of testing and diagnostics will be presented. Systems covered include: •GM Variable Valve Lift and Displacement On Demand •BMW Valvetronics •FCA Multi air •FCA Hemi MDS •Honda Vtech

Instructor: Cliff Shenkel

ATV-52010-4	**HYBRID & ELECTRIC VEHICLE DRIVETRAINS**	**4**	**12/5/2023**

Worldwide, the focus of automotive laws and regulations is on reducing emissions. One way to achieve this goal is increase the number of zero emission vehicles on the road. California has a zero-emissions mandate and China has also adopted a version of California's plan in its new energy mandate. Battery Electric Vehicle (BEV) production numbers are on the rise and are soon going to be commonplace on our streets. It is now time to start learning about BEVs and preparing for this fundamental shift in automotive technology. This class presents an overview of components, operation and tooling needed to successfully compete in this market. Topics include: •Special tools required •Common components between hybrid and electric vehicle drivetrains •Additional components found only on electrical drivetrains •Battery construction and testing •Gear box power flow •Unique testing procedures

Instructor: Adam Robertson

DVT-2010-4	**ALL WHEEL DRIVE TECNOLOTIES**	**4**	**2/6/2024**

Today's SUVs, sedans and sports coupes are embracing all-wheel drive to improve vehicle handling and, in some cases, make better use of high torque/high horsepower powerplants. Don't confuse all-wheel drive with four wheel drive. Although some components are shared between the technologies, all-wheel drive utilizes advanced software and controls to precisely control torque vectoring and aid in the stability of the vehicle. Repairing these vehicles requires not only an understanding of the hardware, but also electronics and control strategies. Topics in the course include: Differences between AWD design vs. 4WD, The role of software's role in AWD operation, Common AWD components and how they operate, Proper diagnostic testing procedures, Analysis of vibration issues

Instructor: Adam Robertson

DVT-2020-4	**FOUR WHEEL DRIVE (4X4) TECHNOLOGIES**	**4**	**2/7/2024**

Four wheel drive (4WD) in itself is not a new concept. Original systems use a mechanically controlled transfer case with the associated driveshafts and axles. Today we see complex hardware design, electronic controls and advanced diagnostic techniques. New systems rely on input sensors, computers, electric motors actuators and data busses to operate. It is crucial to understand the function of all components and how they interact to diagnose problems efficiently. Topics in this course include:

- Hardware construction and operation
- Control systems and sequencing
- Diagnostic routines• Component testing
- Common failures
- 4 hours

Instructor: Adam Robertson

Continued on next page

CHS-5000-4 NOISE, VIBRATION AND HARSHNESS ANALYSIS 4 4/9/2024

Since man began to build machines for industrial use, and especially since motors have been used to power them, problems of vibration reduction and isolation have engaged engineers. Gradually, as vibration isolation and reduction techniques have become an integral part of machine design, the need for accurate measurement and analysis of mechanical vibration has grown. Over the last 15 or 20 years a whole new technology of vibration measurement has been developed which is suitable for investigating modern highly stressed, high speed machinery. Using piezoelectric accelerometers to convert vibratory motion into understandable data, the process of measurement and analysis is efficiently performed by the versatile abilities of these electronics. This class will show you how to use modern techniques to identify the vibration source, track the transfer path and pinpoint the responding component.

Instructor: Adam Robertson

EET-2001-8 MODERN ELECTRONIC FOUNDATIONS 4 6/9/2024 & 6/10/2024

With the introduction of increasingly complex electronics on late model vehicles, it has become critically important to maintain a strong understanding of circuit operation and testing. Have you ever been curious about the reason that Ohm's law works in some cases, but not others? Have you ever considered the practical application of Kirchhoff's laws? This class will address foundational concepts relating to voltage, current, resistance, and power as well as the effects of capacitance and inductance on circuit operation. Additionally, time-saving testing techniques will be highlighted along with tool usage. This is an interdisciplinary class dealing with all types of test equipment ranging from test lights and ohmmeters to lab scopes and megohmmeters. This is not a math class. All laws introduced will be done with the intention of practical application in vehicle diagnostics.

Instructor: Adam Robertson

ATV-6220-4 HYBRID & ELECTRIC VEHICLE SERVICE: AN INTRO 4 8/27/2024

Technicians may find themselves at a disadvantage when faced with new and ever-changing vehicle technology without the foundational knowledge of hybrid and electric vehicles. Some technicians are uncertain of the safety hazards that may exist during repair. This course explains the most current safety regulations, tools and procedures of servicing hybrid vehicles.
Topics include:
Identifying hybrid vehicle configurations
Understanding electric vehicle charging classifications
Proper safety practices and vehicle safety systems
Interlock circuit operation
Analysis of high-voltage relay operation
High-voltage batteries and predicting failures using test equipment or scan data
The need for high-voltage battery maintenance and corrective procedures

Instructor: Adam Robertson

Times are 6:00 pm to 10:00 for Monday - Thursday classes; 8:00 am to 5:00 pm for Saturday classes.
Check with your local CARQUEST Store for changes and/or updates.