COURSE OUTLINE: CVC613 - ENGINE SYSTEMS

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Course Code: Title	CVC613: ENGINE SYSTEMS
Program Number: Name	6080: COMM VEHICLE-COMMON
Department:	MOTIVE POWER APPRENTICESHIP
Semesters/Terms:	20F
Course Description:	Upon successful completion the apprentice is able to explain the terminology used, and explain and identify the operating principles of engine blocks, cylinder heads, valve train and power train components, and is able to perform engine system maintenance, inspection and service procedures - all according to manufacturers` recommendations
Total Credits:	5
Hours/Week:	0
Total Hours:	40
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Essential Employability Skills (EES) addressed in this course:	EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. EES 10 Manage the use of time and other resources to complete projects.
General Education Themes:	Science and Technology
Course Evaluation:	Passing Grade: 50%, d A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail) 49% and below 0.00

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.

CR (Credit) Credit for diploma requirements has been awarded.
S Satisfactory achievement in field /clinical placement or non-graded subject area.
U Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR Grade not reported to Registrar`s office.
W Student has withdrawn from the course without academic penalty.

Books and Required Resources:

Medium/Heavy Duty Truck Engines, Fuels and Computerized Management Systems by Sean Bennett
Publisher: cengage Edition: 6

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
Upon successful completion the apprentice will be able to explain the terminology used on engine blocks, cylinder heads, valve train and power train components.	Upon successful completion, the apprentice is able to: 3.1.1 Explain the fundamentals of engine assemblies. [2/0] - Otto cycle - Diesel cycle - spark ignition - compression ignition - two-stroke cycle - four-stroke cycle 3.1.2 Describe engine terminology. [4/0] - inertia heat - heat - energy - pressure - force - torque - bore - stroke - swept volume - displacement - clearance volume - compression ratio - volumetric efficiency - mechanical efficiency - thermal efficiency - power - indicated horsepower - brake horsepower - Society of Automotive Engineers (SAE) horsepower 3.1.3 Identify the principles of operation of engine assemblies. [4/0] - Otto cycle - Diesel cycle - two-stroke cycle - four-stoke cycle - spark ignition - compression ignition - combustion dynamics - process of combustion

	- combustion chamber design - expansion coefficients - air/fuel ratios - perform basic engine calculations - swept volume - compression ratio - compression pressure - indicated horsepower - brake horsepower - Society of Automotive Engineers (SAE) horsepower - mechanical efficiency - volumetric efficiency - thermal efficiency
Course Outcome 2	**Learning Objectives for Course Outcome 2**
Upon successful completion the apprentice will be able to explain and identify the operating principles of engine blocks, cylinder heads, valve trains and power train components.	Upon successful completion, the apprentice is able to: 3.2.1 Explain the purpose and fundamentals of engine block, cylinder head, valve train, and power train components. [1/0] - engine blocks - design features - configuration - gear train assemblies - cylinder heads - valve train assembly - in block cam - overhead cam 3.2.2 Identify and describe the functions, types, styles, and applications of engine blocks, cylinder heads, valve trains and power train components. [4/4] - cylinder blocks - design feature - top deck surface - main bearing bores - configuration - V-block - inline - sleeves / liners - wet - dry - integral - air cooled - liquid cooled - counter bore - flywheel vibration dampers - crankshaft - connecting rods -piston pins - pistons - piston rings - camshaft and timing gears - cylinder head types

	- overhead cam - L-head - cylinder head and valve train assembly - valves, seats, guides, seals, springs and retainers - rocker assemblies, valve bridges, pushrods, lifters, camshafts - drive mechanisms - injector sleeves and fuel manifolds
Course Outcome 3	**Learning Objectives for Course Outcome 3**
Upon successful completion the apprentice is able to perform engine system maintenance, inspection and service procedures, following manufacturer recommendations.	Upon successful completion, the apprentice is able to: 3.1.1 Explain the terms and maintenance procedures used to service engine systems. [5/0] - lubrication system - lubricating oil ratings - Society of Automotive Engineers (SAE) - American Petroleum Institute (API) - OEM vs. generic aftermarket specifications - lubricating circuits - bypass valve - relief valve - filter types - bypass - full flow - centrifugal - cooling system - coolant handling and waste disposal - fan drives - shroud and fan enclosure - fan clutches - coolant pumps - coolant types - OEM vs. generic aftermarket specifications - radiator coolant level switches - hoses, clamps, and belts - intake systems - pre-cleaners - dry-type air cleaners - wet-type air cleaners - air to air after coolers - air to coolant after coolers - air intake heaters - air intake restriction indicators - exhaust systems - turbo chargers - mufflers - pipes - accessory drive systems - belts - pulleys - gear drives

	- fuel delivery systems - filters - water separators - water in fuel (WIF) - priming procedure 3.3.2 Perform inspections, maintenance and basic service procedures following manufacturers` recommendations for engine lubrication, cooling, intake, exhaust, and fuel systems. [2/14] - servicing oil and oil filters - handling and disposal procedures - pressure test - inspection of lubrication system - determining oil condition - sampling procedure - identify contaminants - bypass filter service procedure - demonstrate the inspection and maintenance procedures for: - radiator condition and pressure testing - radiator and heater hose condition - radiator cap condition and pressure testing - testing pH level of coolant - testing coolant strengths and condition - testing supplemental coolant additives level - testing coolant total dissolved solids level - intake systems - visual inspection - leak testing - air inlet restriction testing - filter servicing - exhaust systems - visual inspection - noise and leak inspection - diesel particulate filter (DPF) - aqueous urea injection system - fuel system - fuel handling and waste disposal - filter replacement - servicing water separators - fuel priming - fuel tank water draining - OEM maintenance tracking software

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
practical application testing	40%
theory testing	60%

Date: October 6, 2020

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Addendum:	Please refer to the course outline addendum on the Learning Management System for further information.