NORTHWESTERN POLYTECHNIC

DEPARTMENT OF TRANSPORTATION TRADES

THINKBIG SERVICE TECHNICIAN COURSE OUTLINE – SPRING 2024

APRIL 29 – JUNE 21, 2024

HES331 VA33 – ENGINE FUNDAMENTALS – 4.0 (112 HOURS)

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR:	Richard McGrail	**PHONE:**	Office 780.835.6778
OFFICE:	FPS 112	**E-MAIL:**	rmcgrail@nwpolytech.ca

OFFICE HOURS: 8 AM to 4:30 PM

CALENDAR DESCRIPTION:
Focusing on the Caterpillar engine product line, this course examines engine function, component, operation, and systems. This includes the disassembly, inspection, and reassembly of a running diesel engine.

PREREQUISITE(S)/COREQUISITE:
Successful completion of Blocks 1 and 2 and HES190, 290 & 390 work placements.
Please read all modules before they are presented in class.

REQUIRED TEXT/RESOURCE MATERIALS:

Caterpillar Material

Caterpillar Engine Fundamentals

Unit 1: Introduction to Caterpillar Diesel Engines

Lesson 1: Caterpillar Engine Product Line

Lesson 2: Caterpillar Diesel Engine Components

Lesson 3: Engine Performance Terminology

Unit 2: Air Intake and Exhaust Systems.

Lesson 1: Intake and Exhaust System Components, Operation and Maintenance

Lesson 2: Remove and Inspect Air Intake and Exhaust System Components

Unit 3: Lubrication Systems and Oil

Lesson 1: Lubrication System Components and Operation

Lesson 2: Remove and Inspect Lubrication System Components

Unit 4: Cooling Systems

Lesson 1: Cooling System Components and Operation

Lesson 2: Remove and Inspect Cooling System Components

Unit 6: 3406 Disassembly and Inspection

Lesson 1: Engine Component Wear

Lesson 2: Caterpillar 3406 Engine Maintenance

Alberta Apprenticeship and Industry Training Individual Learning Modules
Heavy Equipment Technician (HET)

190201a – Engine Fundamentals

190201b – Engine Block and Liner Fundamentals

190201c – Engine Block and Liner Service

190201d – Piston, Piston Rings and Connecting Rod Fundamentals

190201e – Piston, Piston Rings and Connecting Rod Service

190201f – Crankshaft Bearings and Related Component Fundamentals

190201g – Crankshaft Bearings and Related Component Service

190201h – Camshaft and Follower Fundamentals

190201i – Camshaft and Follower Service

190201j – Cylinder Head Fundamentals

190201kA – Cylinder Head Service – Part A

190201kB – Cylinder Head Service – Part B

1902011 – Engine Braking System Fundamentals and Service

190202a – Air induction and Exhaust Systems

190202b – Turbocharged Air Systems

190202c – Lube Systems and Crankcase Ventilation

190202dA – Cooling Systems (Liquid and Air) – Part A

190202dB – Cooling Systems (Liquid and Air) – Part B

190404c – Failure and Fluid Analysis

DELIVERY MODE:
In person – Onsite. This course is delivered in person at the NWP Fairview campus.

- NWP reserves the right to change the course delivery.

LEARNING OUTCOMES:

TRANSFERABILITY: None

CREDIT/CONTACT HOURS: Credits: 4.0 / Contact Hours: 112

GRADING CRITERIA: Students must complete all required courses with a grade point average of no less than 2.7 and no failing (F) grades. A passing grade in this course is a **minimum of 70%.**

Engine Fundamentals ..... 112 / 240 hours = 47 % of Semester 3 mark

Exams Average =	_____	**x 45%**
Class Assignments/Quizzes =	_____	**x 30%**
Shop Total	_____	**x 25%**

HES 331 VB31 FINAL MARK = _____ %

Grades for this course will be assigned as a percentage.

COURSE SCHEDULE/TENTATIVE TIMELINE:

Machine Electronics

- Machine Electronic Components
- Electronically Controlled Engines
- CAT ET
- Data View

Machine Diagnostics

- Introduction to Diagnostics and Troubleshooting

Engine Diagnostics and Repair

- Diagnosis and Troubleshooting
- Engine Oil and Lubrication Systems
- Engine Air Induction Systems
- Engine Cooling Systems
- Engine Fuel Systems

Machine Specific

- 980K Wheel Loader - Electrohydraulic Control System.
- Compact Construction Equipment.
- 320E Excavator.
- D5H Crawler
- D7E Crawler
- Articulated Dump Truck.
- Skid Steers
- M Series Motor Graders.
- Challenger Tractor
- IT Integrated Tool Carrier
- 426 Backhoe
- CP-54B Vibratory Compactor

STUDENT RESPONSIBILITIES:

This is an adult education environment. Enrolment at Northwestern Polytechnic assumes that the student will become a responsible citizen of the College. As such, each student will display a positive work ethic, take pride in and assist in the maintenance and preservation of Institute property, and assume responsibility for his/her education by researching academic requirements and policies, demonstrating courtesy and respect toward others; and respecting instructor expectations concerning attendance, classroom and shop rules, safety, assignments, deadlines and appointments. Students are learning skills to prepare them for the work environment.

Following the guidelines in "Student Rights and Responsibilities" in the NWP College calendar assist us all in maintaining an adult learning environment. Please refer to the Student Rights and Responsibilities policy in the Northwestern Polytechnic Calendar or at www.nwpolytech.ca/downloads/documents/StudentRightsandResponsibilities.pdf.

STATEMENT ON PLAGIARISM AND CHEATING:

Refer to the Student Conduct section of the NWP Calendar at http://www.nwpolytech.ca/programs/calendar/ Pages 44 to 46 or the College Policy on Student Misconduct: Plagiarism and Cheating at **

**Note: all Academic and Administrative policies are available on the same page.

