

**DEPARTMENT OF TRANSPORTATION TRADES  
THINKBIG SERVICE TECHNICIAN COURSE OUTLINE – SPRING 2023  
APRIL 24, 2023 – JUNE 16, 2023**

**HES331 VA32 – ENGINE FUNDAMENTALS – 4.0 (112 HOURS)**

**INSTRUCTOR:** Richard McGrail                      **PHONE:** 780.835.6778  
**OFFICE:** FPS 110                                      **E-MAIL:** rmcgrail@nwpolytech.ca  
**OFFICE HOURS:** 8.00am – 4.30pm

**PREREQUISITE(S)/COREQUISITE:** Successful completion of Blocks 1 and 2 and completion of HES190, 290 & 390 work placement.  
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
- 190201l – 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

**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.

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

**DELIVERY MODE(S):** Fairview Campus delivery

**TRANSFERABILITY:** None.

**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/DPC = \_\_\_\_\_ x 30%**

**Shop Total \_\_\_\_\_ x 25%**

**HES331 VA32 FINAL MARK = \_\_\_\_\_ %**

| <b>NORTHWESTERN POLYTECHNIC</b> |                           |                              |  |
|---------------------------------|---------------------------|------------------------------|--|
| <b>GRADING CONVERSION CHART</b> |                           |                              |  |
| <b>Alpha Grade</b>              | <b>4-point Equivalent</b> | <b>Percentage Guidelines</b> | <b>Designation</b>                         |
| <b>A<sup>+</sup></b>            | <b>4.0</b>                | <b>90 – 100</b>              | <b>EXCELLENT</b>                           |
| <b>A</b>                        | <b>4.0</b>                | <b>85 – 89</b>               |  |
| <b>A<sup>-</sup></b>            | <b>3.7</b>                | <b>80 – 84</b>               | <b>FIRST CLASS STANDING</b>                |
| <b>B<sup>+</sup></b>            | <b>3.3</b>                | <b>77 – 79</b>               |  |
| <b>B</b>                        | <b>3.0</b>                | <b>73 – 76</b>               | <b>GOOD</b>                                |
| <b>B<sup>-</sup></b>            | <b>2.7</b>                | <b>70 – 72</b>               |  |
| <b>F</b>                        | <b>0.0</b>                | <b>67 – 69</b>               | <b>FAIL</b>                                |
| <b>F</b>                        | <b>0.0</b>                | <b>63 – 66</b>               |  |
| <b>F</b>                        | <b>0.0</b>                | <b>60 – 62</b>               |  |
| <b>F</b>                        | <b>0.0</b>                | <b>55 – 59</b>               |  |
| <b>F</b>                        | <b>0.0</b>                | <b>50 – 54</b>               |  |
| <b>F</b>                        | <b>0.0</b>                | <b>0 – 49</b>                |  |
| <b>WF</b>                       | <b>0.0</b>                | <b>0</b>                     | <b>FAIL, withdrawal after the deadline</b> |

### **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](http://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 <http://www.nwpolytech.ca/about/administration/policies/>. \*\*

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