

**DEPARTMENT OF INDUSTRY PARTNER TRAINING
THINKBIG SERVICE TECHNICIAN COURSE OUTLINE – WINTER 2025**

HES 331 VZ32: ENGINE FUNDAMENTALS – 4 CREDITS (7-0-7)

112 HOURS FOR 8 WEEKS

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
OFFICE: FAC 119
OFFICE HOURS: 8:30 AM – 4:00 PM

PHONE: 780-835-6778
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CALENDAR DESCRIPTION:

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

PREREQUISITE(S): Successful completion of Blocks 1 and 2 and HES190, & 290 work placements. Successful completion of first period AIT.

Please read all modules before they are presented in class.

COREQUISITE(S): None

REQUIRED MATERIALS:

Caterpillar Material

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

SEBD0640 – Oil and Your Engine

SEBD0518 – Know your cooling system

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

DELIVERY MODE(S):

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

Note: NWP reserves the right to change course delivery.

LEARNING OUTCOMES:

TRANSFERABILITY:

None

GRADING CRITERIA

Students must complete all required courses with no failing (F) grades. A passing grade in this course is a **minimum of 70%**. Grades for this course will be assigned as a percentage. Failure to achieve a minimum grade of 70% will result in withdrawal from the Think BIG program.

EVALUATIONS:

Engine Fundamentals

112 hours

Exams Average = _____ *x 45%*

Class Assignments / Quizzes = _____ *x 30%*

Shop Total _____ *x 25%*

FINAL MARK = _____ %

COURSE SCHEDULE/TENTATIVE TIMELINE:

Will be posted in the classroom.

- Engine Fundamentals Section 1 – modules 190201 a- e
- Engine Fundamentals Section 2 – modules 190201 f – 1
- Engine Fundamentals Section 3 – modules 190202 a-db & 190404c

STUDENT RESPONSIBILITIES:

This is an adult education environment. Enrolment at Northwestern Polytechnic assumes that the student will become a responsible citizen of NWP. As such, each student will display a positive work ethic, take pride in and assist in the maintenance and preservation of Institution 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. Non-academic misconduct, including possession, use, or distribution of intoxicants will be addressed through the Student Rights and Responsibilities policy.

Students are expected to attend all class and shop hours. Students who miss more than 21 hours or 3 days of classes may be removed from the course.

Absences will be monitored and recorded by instructors.

- Upon reaching 7 hours missed time in a single semester the student will be required to meet with the program Instructor
- Upon reaching 14 hours missed time in a single semester the student will be required to meet with the program Chair and the Instructor.
- Upon reaching 21 hours missed time in a single semester the student will meet with the program Chair, the Instructor and the Dean to evaluate the students' ability to successfully continue in the Think BIG program.

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 ACADEMIC MISCONDUCT:

Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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