

DEPARTMENT OF INDUSTRY PARTNER TRAINING

THINKBIG SERVICE TECHNICIAN COURSE OUTLINE – SPRING 2026

HES 511 VZ43 POWER TRAIN II – 3.5 CREDITS (6-0-6) IN 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: Darcy Moss **PHONE:** 780.835.6765
OFFICE: FPS119 **E-MAIL:** dmoss@nwpolytech.ca
OFFICE HOURS: 8.30 AM to 4:30 PM

CALENDAR DESCRIPTION: Power train drives that have a hydraulic component to them will be covered in this course. Torque converters, gearing principles, power shift and automatic transmissions are covered in relation to operation, diagnostics and service procedures. Also included are hydraulic retarders, tracked equipment steering and undercarriage fundamentals and service. Final drive operation and service, differentials as applied to off-road will also be discussed. Wheeled equipment steering and suspension as well as off-road equipment accessories and attachments will be discussed in reference to off-road machines.

PREREQUISITE(S): None

COREQUISITE: None

REQUIRED TEXT/RESOURCE MATERIALS:

Caterpillar Material

Power Train 1.

Unit 2: Couplings

Lesson 2 – Torque Converters and Torque Dividers

Unit 3: Transmissions

Lesson 2 – Power Shift Transmissions

Lesson 3 – Power Shift Transmission Control Systems

Power Train 2

Unit 1: Differentials

Lesson 5 – Differential Steering

Lesson 6 – Steering Clutch and Brake

Unit 3: Undercarriage

Lesson 1 – Undercarriage Components

Lesson 2 – Undercarriage Wear and Operation

Lesson 3 – Track and Shoe Options

Unit 4: Final Drives, Chain Drives, and Tires

Lesson 1 – Final Drives

Lesson 2 – Chain Drives and Tires

Machine Hydraulic Systems

Unit 1: Pilot Operated Hydraulic Systems.

Lesson 2: 950H Pilot Operated Command Control Steering System.

Unit 2: Load Sensing, Pressure Compensated Hydraulic System

Lesson 3: 950H HMU Steering Hydraulic System.

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

- 190302aA – Wheeled Equipment Steering Fundamentals and Service – Part A
- 190302aB – Wheeled Equipment Steering Fundamentals and Service – Part B
- 190302b – Suspension System Fundamentals and Service
- 190302cA – Off-Road Equipment Accessories and Attachments – Part A
- 190302cB – Off-Road Equipment Accessories and Attachments – Part B
- 190303a – Gearing Principles
- 190303b – Torque Converter Fundamentals and Service
- 190303c – Powershift and Automatic Transmission Mechanical/Electronic Components
- 190303d – Powershift and Automatic Transmission Control and Shifting
- 190303e – Hydraulic Retarder Fundamentals
- 190303f – Powershift and Automatic Transmission Testing and Service
- 190303gA – Tracked Equipment Steer Fundamentals and Service – Part A
- 190303gB – Tracked Equipment Steer Fundamentals and Service – Part B
- 190303hA – Undercarriage System Fundamentals and Service – Part A
- 190303hB – Undercarriage System Fundamentals and Service – Part B

- 190303i – Final Drive Fundamentals and Service (Off-Road)
- 190303jA - Drive Axle and Carrier Fundamentals and Service (Off Road) – Part A
- 190303JB - Drive Axle and Carrier Fundamentals and Service (Off Road) – Part B
- 190303k – Clutch Fundamentals and Service (Off Road).

DELIVERY MODE(S): In person delivery.

Note: NWP reserves the right to change the course delivery.

LEARNING OUTCOMES:

TRANSFERABILITY: None.

EVALUATION:

Power Train II..... 96 / 240 hours = 40 %
of Semester 5 mark

Exams Average = _____ x 45%

Class Assignments/Quizzes/DPC = _____ x 30%

Shop Total _____ x 25%

HES511 VB42 FINAL MARK = _____ %

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 removal from the Think BIG program.

COURSE SCHEDULE/TENTATIVE TIMELINE:

- Gearing Principles
- Drive Axle and Carrier Fundamentals
- Final Drives
- Torque Converters

- Transmissions and Retarders
- Wheeled/Track Steering
- Suspension
- Undercarriages
- Off-Road Accessories

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 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. Non-academic misconduct, including the 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 the 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 instructor and program Chair.
- Upon reaching 21 hours missed time in a single semester the student will be required to meet with the instructor, program chair and the Dean to evaluate the students' ability successfully continue in the Think BIG program.

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.