

DEPARTMENT OF INDUSTRY PARTNER TRAINING

THINKBIG SERVICE TECHNICIAN COURSE OUTLINE – WINTER 2025

MARCH 3, 2025- APRIL 25, 2025

HES131 VZ12 ELECTRICAL FUNDAMENTALS – 1.5 (48 HOURS)

(3-0-3)

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: Russell Hall

PHONE: 780-834-8788 CELL

OFFICE: FPS 110

E-MAIL: rhall@nwpolytech.ca

OFFICE HOURS: 8.00am to 4.30pm

CALENDAR DESCRIPTION: This course will introduce students to basic electrical and electronic fundamentals. Topics included are electrical circuits; electrical components, schematics and symbols; the use of test equipment and battery service and testing.

PREREQUISITE(S)

COREQUISITE: None

REQUIRED TEXT/RESOURCE MATERIALS:

Caterpillar Material

Electrical Fundamentals

Unit 1: Introduction to Electricity

Lesson 1 – Electricity, How It Works

Lesson 2 – Magnetism

Unit 2: Electrical Circuits

Lesson 1 – Ohm’s Law
Lesson 2 – Basic Circuit Theory
Lesson 3 – Digital Multimeter
Lesson 4 – Electrical Measurement

Lesson 5 – Circuit Faults

Unit 3: Electrical Components and Symbols

Lesson 1 – Basic Electrical Components
Lesson 2 – Solid State Electrical Components
Lesson 3 – Electrical Schematics

Unit 4: Machine Electrical Systems

Lesson 1 – Battery

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

190104a – Electrical Theory.
190104b – Electrical Circuits
190104c – Magnetism
190104d – Test Equipment
190104e – Battery Fundamentals and Service
190104f – Electrical Wiring, Lighting Circuits and Circuit Protection
190104g – Basic Electronics
190104h – Electronic Control Systems

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:

- Explain how electricity and magnetism work
- Explain the relationship between electrical voltage, current, resistance, and power using Ohm’s law
- Calculate and solve unknown values for series, parallel, and seriesparallel circuits
- Solve basic electrical faults on an electrical training aid
- Identify and explain the function of electrical components and symbols
- Explain the function of a battery and test the battery for proper function.

- Explain the operation of a charging system and test the charging system and its components for proper function.
- Explain the operation of a starting system and test the starting system and its components for proper function.

TRANSFERABILITY: None.

CREDIT/CONTACT HOURS: Credits: 1.5 / Contact Hours: 48.

GRADING CRITERIA: A passing grade in this course is a **minimum of 70%**.

Electrical Fundamentals..... 48 / 240 hours = 20 %
of Semester 1 mark

Exams Average = _____ x 45%

Class Assignments/Quizzes = _____ x 30%

Shop Total _____ x 25%

HES 131 VB11 FINAL MARK = _____ %

Grades for this course will be assigned as a percentage.

COURSE SCHEDULE/TENTATIVE TIMELINE:

March 3 to April 25, 2025

- Electrical Theory
- Electrical Circuits
- Magnetism
- Test Equipment
- Batteries Fundamentals and Service
- Wiring
- Basic Electronics

- Electronic Control Systems

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 Chair.
- Upon reaching 14 hours missed time in a single semester the student will be required to meet with the program Chair and the Dean.
- Upon reaching 21 hours missed time in a single semester the student will be required to meet with the program Chair, the Instructor 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.