

## PROGRAM INFORMATION

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|-------------------------|----------------------------|
| <b>Academic Year</b>    | 2024 - 2025                |
| <b>Credential</b>       | Ontario College Diploma    |
| <b>Program Delivery</b> | Full - Time                |
| <b>Duration</b>         | 2 years                    |
| <b>Length</b>           | 4 Semesters                |
| <b>Program Codes</b>    | T121 (PC) – Timmins Campus |

## DESCRIPTION

Tackle some of the mightiest machines on Earth.

When it comes to machinery, if you believe bigger is better, then this program is for you. Northern's two-year Motive Power Technician – Heavy Equipment diploma will give you the knowledge and skills you need to take on the monster machines that power our economy. The Heavy Equipment Technician is part of the Interprovincial Red Seal Program – the national standard for the trade across Canada.

In an apprenticeship environment focused on teamwork, personal safety and problem solving, you'll be trained to meet the challenges of increasingly complex work environments. While developing a standard of craftsmanship that sets you apart, you'll learn to diagnose and repair the mechanical, electric, and electronic systems that our industries depend on.

After that, you'll be qualified to work in the forestry, mining, and construction industries, or at a dealership, insurance company, or service and repair shop.

This program will also prepare you to apply your knowledge in analyzing and solving heavy duty equipment system problems. You will learn how to diagnose and repair mechanical, electronic and electrical heavy duty equipment components and systems using a variety of troubleshooting techniques and testing equipment to support heavy equipment operations.

A Heavy-Duty Equipment Technician inspects, diagnoses, troubleshoots, repairs, and verifies the repair of heavy-duty equipment. They work on different types of heavy-duty equipment such as draft shaft drive axle assemblies, final drive, structure components and accessories, tires, wheels, frames and undercarriages, and ground engaging equipment and attachments.

## CAREER OPPORTUNITIES

Graduates may work in dealerships, service and repair shops, or retail stores. They may also work within the forestry, mining, and construction industries or for insurance companies.

- Heavy-duty equipment technician
- Employed by companies that own and operate heavy equipment, heavy equipment dealers, rental and service establishments, railway transport companies, and urban transit systems.

## VOCATIONAL LEARNING OUTCOMES

1. Analyze, diagnose, and solve various motive power system problems by using problem-solving and critical thinking skills and strategies and by applying fundamental knowledge of motor vehicle operation, components, and their interrelationships.
2. Diagnose and repair climate control systems in compliance with manufacturers' recommendations.
3. Diagnose and repair engine systems in compliance with manufacturers' recommendations.
4. Diagnose and repair electrical, electronic, personal safety, and emission components and systems in compliance with manufacturers' recommendations.
5. Diagnose and repair drive train components and systems in compliance with manufacturers' recommendations.
6. Diagnose and repair suspension, steering, and brake components and systems in compliance with manufacturers' recommendations.
7. Disassemble and assemble components to required specifications by applying workshop skills and knowledge of basic shop practices.
8. Select and use a variety of troubleshooting techniques and test equipment to assess electronic circuits, vehicle systems, and subsystems.
9. Apply knowledge of hydraulics and pneumatics to the testing and analysis of motive power systems and subsystems.
10. Communicate information effectively, credibly, and accurately by producing supporting documentation to appropriate standards.
11. Use information technology and computer skills to support work in a motive power environment.
12. Prepare, support, maintain, and communicate data from log, record, and documentation systems.
13. Apply business practices, project management skills, and communication skills to improve customer service.
14. Assist in quality-control and quality-assurance programs and procedures.
15. Develop and use personal and professional strategies and plans to improve professional growth, job performance, and work relationships.
16. Complete all assigned work in compliance with occupational, health, safety, and environmental law; established policies and procedures; codes and regulations; and in accordance with ethical principles.

## PROGRAM COURSES

The following reflects the planned course sequence for full-time offerings of the program. Programs at Northern College are delivered using a variety of instruction modes. Courses may be offered in the classroom or lab, entirely online, or in a hybrid mode which combines classroom sessions with virtual learning activities.

| <b>Semester 1</b>          |                                               | <b>Hours</b> |
|----------------------------|-----------------------------------------------|--------------|
| EL1143                     | Electrical & Electronics I                    | 42           |
| EN1592                     | Communication Fundamentals                    | 28           |
| GN1033                     | Health and Safety                             | 42           |
| GN1443                     | Indigenous Culture and Awareness              | 42           |
| IN1092                     | Computer Methods Trades Software              | 28           |
| MA1002                     | Mathematics & Precision Measurement I         | 28           |
| MP1004                     | Trade Practices and Applications Motive Power | 56           |
| MP1015                     | Drive Train Systems I                         | 70           |
| WE1092                     | Welding I                                     | 28           |
| <b>Semester 2</b>          |                                               |              |
| EN1582                     | Applied Communications I                      | 28           |
| HD2003                     | Fluid Power I                                 | 42           |
| HD2004                     | Fuels I                                       | 56           |
| MA2022                     | Mathematics & Precision Measurement II        | 28           |
| MP1005                     | Engines I                                     | 70           |
| MP2003                     | Motive Power Electrical II                    | 42           |
| MP2025                     | Steering, Suspension and Brakes I             | 70           |
| WE2092                     | Welding II                                    | 28           |
| <b>Semester 3</b>          |                                               |              |
| General Education Elective |                                               | 42           |
| HD3003                     | Fluid Power II                                | 42           |
| MP2015                     | Engines II                                    | 70           |
| MP3033                     | Motive Power Electrical III                   | 42           |
| WE3002                     | Welding III                                   | 28           |
| MP3044                     | HVAC                                          | 56           |
| <b>Semester 4</b>          |                                               |              |
| BU4073                     | Entrepreneurship                              | 42           |
| General Education Elective |                                               | 42           |
| HD2024                     | Heavy Equipment Techniques Practical Lab      | 56           |
| HD3025                     | Fuels II                                      | 70           |
| HD4002                     | Fluid Power III                               | 28           |
| HD4004                     | Steering, Suspension and Brakes II            | 56           |
| PT4006                     | Power Trains II                               | 84           |

## PROGRAM PROGRESSION

The following reflects the planned progression for full-time offerings of the program.

Sem 1: Fall 2024  
Sem 2: Winter 2025

Sem 3: Fall 2025  
Sem 4: Winter 2026

## WORK INTEGRATED LEARNING OPPORTUNITIES

N/A

## ARTICULATION/TRANSFER AGREEMENTS

A number of articulation agreements have been negotiated with universities and other institutions across Canada, North America and internationally. These agreements are assessed, revised and updated on a regular basis. Please contact the program coordinator for specific details if you are interested in pursuing such an option. Additional information can be found at [Articulation Agreements](#).

## ADDITIONAL INFORMATION

N/A

## PROGRAM SPECIFIC REQUIREMENTS

N/A

## ADMISSION REQUIREMENTS

- Ontario Secondary School Diploma (OSSD)
- Grade 12 English (C, U)
- Grade 11 Math (C, M, U)
- Or equivalent

Academic prerequisites for this program may be obtained free of charge through [Academic Upgrading](#). Applicants who do not have a high school diploma or equivalent and will have reached the age of 19 years on or before the start of the program must undergo academic testing and may be required to complete [Prior Learning Assessment & Recognition \(PLAR\)](#) process to demonstrate equivalency of admission requirements prior to admission into a program. For more details, please contact the Admissions Office at 705-235-7222 or [admissions@northern.on.ca](mailto:admissions@northern.on.ca).

## Additional Requirements for International Students

In addition to the general admission requirements, international students must have proof of English Proficiency and meet the requirements below.

1. Proof of Senior High School Diploma/Certificate
2. English Proficiency (we will require one of the following):
  - IELTS Academic International English Language Testing System: a minimum overall score of 6.0 must be achieved with no individual band score under 6.0; however, we will accept one band at 5.5.
  - TOEFL (Test of English as a Foreign Language) – Internet Based Test (iBT) overall minimum score of 79
  - PTE (Pearson Test of English) Academic – Graduate Diploma: 58+

If your country of citizenship has English as its official language, we may accept alternate proof of English Proficiency. All educational documents must be submitted in English and will be dependent on the country of citizenship. For more information, please contact [admissions@northern.on.ca](mailto:admissions@northern.on.ca).

## GRADUATION REQUIREMENTS

- 24 Program Courses
- 2 Communications Courses
- 4 General Education Courses

## GRADUATION ELIGIBILITY

To graduate from this program, a student must attain a minimum of 60% or a letter grade of CR (Credit) in each course in each semester unless otherwise stated on the course outline. Students should consult departmental policies and manuals for additional detail and exceptions.

## GRADUATION WINDOW

Students unable to adhere to the program duration of two years (as stated above) may take a maximum of four years to complete their credential. After this time, students must be re-admitted into the program, and follow the curriculum in place at the time of re-admission.

## CONTACT INFORMATION

For questions about being admitted into the program, please contact Northern College Admissions at [admissions@northern.on.ca](mailto:admissions@northern.on.ca) or by phone at 705-235-3211 ext. 7222. For questions about the content of the program, contact the Program Coordinator.

Matt Dupuis, Program Coordinator  
Tel: 705-235-3211 ext. 2196  
Email: [dupuism@northern.on.ca](mailto:dupuism@northern.on.ca)

## COURSE DESCRIPTIONS

### Semester 1

#### **EL1143 Electrical & Electronics I**

Students learn the fundamentals of DC electrical and electronic systems, using problem solving techniques and circuit board testing. Topics include basic electrical and electronic theory, problem solving using Ohm's Law and use of Digital Multimeters.

#### **EN1592 Communication Fundamentals**

A required course in the first semester of the Mechanical Techniques - Industrial Millwright, Motive Power Technician - Automotive Service, and Heavy Equipment Techniques programs at Northern College, Communication Fundamentals will provide students with an opportunity to reinforce their use of Standard English, develop their abilities to communicate effectively in the workplace and improve their capabilities with computer technology, particularly in using Word, Excel and Alldatapro to produce accurate and professional documents. As well, students will be required to use information technology like Blackboard and their own computing devices to research information online to learn about their trade pathway, find technical information using an industry system like Alldatapro, and to complete course assignments.

#### **GN1033 Health and Safety**

This course introduces the student to health and safety in their home, in society and within an occupational setting. Students learn about the social and personal benefits of safe work practices and the methods to best prevent accidents or injuries. Students will review the role, rights and responsibilities of an individual in today's health and safety conscious world. Students also learn how to read and interpret the Occupational Act and Regulations.

#### **GN1443 Indigenous Culture and Awareness**

This general education course will provide students with an introduction to Canadian Indigenous Nations' history, sovereignty, land titles, cultural history and current critical issues. Topics addressed include the content of Indigenous rights, economic and social development, community and political processes, and business law and policies, justice & social services. Canadian Indigenous History and Relations is a general education course that has been incorporated into all programs at Northern College.

#### **IN1092 Computer Methods Trades Software**

This course introduces students to careers in the motive power sector. Students will also use various service information systems required to successfully inspect, test and repair motive power vehicles. Students will access online service information to create work orders, research motive power system operations, identify component locations and electrical diagrams, and locate service information to aid in diagnostics and repairs.

#### **MA1002 Mathematics & Precision Measurement I**

Students will learn the basic mathematics and measuring instruments needed in the repair trade for mechanics and will relate the basic math for measuring and problem solving in repair and maintenance.

## **MP1004 Trade Practices and Applications Motive Power**

Topics include shop safety and safe working habits, proper vehicle lifting practices, hand, shop and power tool identification and selection, use of precision tools, learn about fasteners, torque, bearing and seals. The students will put into practice what they have studied in theory class.

## **MP1015 Drive Train Systems I**

This course is designed to give students an understanding of how the power from the engine reaches the vehicles drive wheels. Students will be able to explain the purpose and function of the clutch assembly, manual transmissions, drive and axle shafts, and single reduction final drives and differentials. Students will also be able to inspect, diagnose and recommend repair procedures on the clutch, transmission, and drive axle assembly.

## **WE1092 Welding I**

This course is designed to assist beginning students with the basic principles of welding. The emphasis is placed on practical applications and to assist the student in developing more advanced skills. The course content will be shared between shop and classroom time at the discretion of the professor.

## **Semester 2**

## **EN1582 Applied Communications I**

This course is required in the second semester of the Motive Power Technician – Automotive Service, Heavy Equipment Techniques, Motive Power Technician – Heavy Equipment and Mechanical Technician and Techniques – Industrial Millwright and Mechanical Technician – Welding Fitter trades programs at Northern College. The purpose of this course is to give students an opportunity to develop and enhance basic communication skills as required in the workplace. Students will also be required to use a computer to complete assignments and other course work, work independently and collaboratively, follow instructions and complete assigned tasks on time.

## **HD2003 Fluid Power I**

Students will be able to explain the fundamentals, rules and laws that govern fluid power systems. Students will perform mathematical calculations to find pressure, force, and area. Students will learn the symbols of components and be able to identify and explain the principles and purpose of the components found in a hydraulic circuit.

## **HD2004 Fuels 1**

This course is designed to introduce students to the diesel fuel system. Students will learn about the properties of diesel and alternative fuels and be able to map the fuel system and explain the purpose of each component of the fuel system. The students will have the opportunity to identify and describe systems, demonstrate the use of diagnostic tools and repair various problems as it relates to the engine fuel system and its component.

## **MA2022 Mathematics & Precision Measurement II**

This course continues the development of knowledge and skills required to achieve success in the motive power industry. Students will review precision measurement and percent applications, as well as learn about ratios and proportions, geometry, and graphing.

## **MP1005 Engines I**

This course is designed to provide students with a fundamental understanding of the operating principles, types, and designs of the modern internal combustion engine. Students will be able to explain how the engine produces torque and identify short block and cylinder head components. Students will have the opportunity to practice the skills learned using special tools and measuring instruments in the practical section of the course.

## **MP2003 Motive Power Electrical II**

This course continues the development of knowledge and skills required to maintain and diagnose motive power electrical systems. The subjects of study include the following systems: electromagnetic devices, wiring and wire repairs, advanced circuit diagnosis, electrical schematics, flooded batteries, and starter motors. The students will have the opportunity to identify and describe systems, demonstrate the use of diagnostic tools, and recognize and solve problems using a strategy-based approach.

## **MP2025 Steering, Suspension and Brake Systems I**

Students are introduced to motive power type steering, suspension, and braking systems. The subjects of study include the fundamentals of steering systems and components, tires, wheels, hubs, and hydraulic braking systems. Students will have the opportunity to practice the skills learned in the practical section of the course.

## **WE2092 Welding II**

This course is designed to assist beginning students with the basic principles of welding. The emphasis is placed on practical applications and to assist the student in developing more advanced skills. The course content will be shared between shop and classroom time at the discretion of the professor.

## **Semester 3**

### **General Education Elective**

General Education Courses are selected online each semester by the student from a list provided and exposes students to a related area of study outside of their immediate academic discipline. Certain programs have predetermined electives.

## **HD4002 Fluid Power III**

This course continues the development of fluid power applications. Students have an opportunity to advance their skills and knowledge in graphic symbols, calculations, fluids, conditioners, control valves and hydraulic pumps.

## **MP2015 Engines II**

Students are introduced to the basic construction of internal combustion engines, and will learn the proper maintenance, cleaning, inspection and overhaul procedures of gasoline engines and components. Topics will include the construction and repair of valve trains and camshafts, cylinder heads, engine testing and start-up procedures and engine component failure analysis.

## **MP3033 Motive Power Electrical III**

This course continues the development of knowledge and skills required to maintain and diagnose motive power electrical systems. The subjects of study include the following systems: electronics and electrical accessories such as lights, instrumentation, horns, wipers, and blower motors. This course also includes the

fundamentals, operation, testing and repair of charging systems. The students will have the opportunity to identify and describe systems, demonstrate the use of diagnostic tools, and recognize and solve problems using a strategy-based approach.

## **MP3044 HVAC**

This course is designed to provide the student with practical experience in diagnosis and repair of heating and air conditioning systems. Also, the successful student will earn ODP Certification for the purchasing and/or handling of refrigerants throughout Canada, to fulfill provincial and federal regulations.

## **WE3002 Welding III**

This course is designed to develop additional advanced skills in Arc Welding by building on past skills of oxygen acetylene, arc welding and by progressing to the horizontal and vertical position. The emphasis is placed on practical applications.

## **Semester 4**

### **General Education Elective**

General Education Courses are selected online each semester by the student from a list provided and exposes students to a related area of study outside of their immediate academic discipline. Certain programs have predetermined electives.

## **BU4073 Entrepreneurship**

This course introduces students to the nature of business and entrepreneurship. Students will obtain an overview of entrepreneurship and the entrepreneurial process then expand into key concepts including business types, customers, marketing, financials, and human resources. The options of franchising and purchasing existing businesses are also covered in this course. Students will outline and assess the components of a Business Plan.

## **HD2024 Heavy Equipment Techniques Practical Lab**

The Heavy Equipment Techniques Practical Lab allows students supplementary hands-on learning in a trades shop environment. Students practice, and master practical skills required to be successful in the motive power industry. Practical elements include mechanical systems competencies such as: engine, fuel, brakes, steering, suspension, electrical, driveline, welding, and fabrication.

## **HD3025 Fuels II**

This course continues the development of knowledge and skills required to maintain and diagnose advanced heavy-duty fuel and emission systems. Students will learn the operating principles, component design, function, diagnosis and repair procedures of electronically managed diesel fuel injection systems and emission systems. Also, students will learn computer principles and demonstrate scan tool diagnosis.

## **HD4002 Fluid Power III**

This course continues the development of skill and knowledge of fluid power systems. Students will learn the fundamentals of hydraulic systems and their components, as well as testing procedures and design differences.

## **HD4004 Steering, Suspension and Brakes II**

This course continues the development of knowledge and skills required to maintain and diagnose heavy-duty chassis systems. Students will be taught how to inspect, diagnose, and repair the following systems: steering systems, tires, wheels, hubs, track systems, hydraulic and air brake systems. The students will have the opportunity to identify and describe systems, demonstrate the use of diagnostic tools, and recognize and solve problems using a strategy-based approach.

## **PT4006 Power Trains II**

This course continues the development of knowledge and skills required to maintain the heavy-duty drive train system. Students will learn about the fundamentals, operation, testing and repair of torque converters, fluid couplings, hydraulic retarders, final drives, and power shift transmissions. The students will have the opportunity to identify and describe systems, demonstrate the use of diagnostic tools, and recognize and solve problems using a strategy-based approach.