DEPARTMENT OF HEAVY EQUIPMENT PROGRAMS

COURSE OUTLINE – FALL SEMESTER 1

HE 1400 ELECTRICAL 1 & ELECTRONIC 1 – 6(96 HOURS/16 WEEKS) 40 LECTURE – 56 LAB/SHOP

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OFFICE HOURS:	Monday to Friday		

PREREQUISITE(S)/COREQUISITE:

English 20-1, English 20-2 or equivalent

Math 20-1, Math 20-2, Math 20-3 or equivalent

A 20-level Science or equivalent

Although a high school diploma is not required for entrance to this program, students should be aware that some employers may require a High School Diploma as a prerequisite to employment.

Applicants who do not meet these requirements may be admitted to the program but they will be required to pass the Apprenticeship & Industry Training (AIT) Trades Entrance Exam during the first semester, if choosing to pursue an apprenticeship

REQUIRED TEXT/RESOURCE MATERIALS: 1st Period Heavy Equipment Technician ILM Modules

CALENDAR DESCRIPTION:

Apply scientific principles to explain electrical theory. Identify electrical circuit types and circuit defects. Apply scientific principles to explain the theory of magnetism. Use electrical test equipment to measure electrical values and check circuit operation. Service, test and charge a lead-acid battery. Test and repair electrical circuits. Test discrete electronic components used in the trade. Describe the operation of basic computer-controlled systems.

CREDIT/CONTACT HOURS: 6 Credits – 96 Contact Hours – 6 hours per week

DELIVERY MODE(S): Instructor led classroom theory (40 hours), instructor led lab/shop (56 hours).

OBJECTIVES (OPTIONAL): The program has been developed to provide students with entry level skills as a Heavy Equipment Technician. After obtaining a requisite number of hours in the work force, the student would be eligible to continue with Alberta Apprenticeship and Industry training in the Heavy Equipment Technician trade towards journeyman certification.

TRANSFERABILITY: None

GRADING CRITERIA: A grade of 65% or higher is required to pass this course. Students must complete all required courses with a grade point average of no less than 2.0 and no failing (F) grades.

GRANDE PRAIRIE REGIONAL COLLEGE			
GRADING CONVERSION CHART			
Alpha Grade	**4-point Equivalent**	**Percentage Guidelines**	**Designation**
A+	**4.0**	**90 – 100**	**EXCELLENT**
A	**4.0**	**85 – 89**	
A-	**3.7**	**80 – 84**	**FIRST CLASS STANDING**
B+	**3.3**	**77 – 79**	
B	**3.0**	**73 – 76**	**GOOD**
B-	**2.7**	**70 – 72**	
C+	**2.3**	**67 – 69**	**SATISFACTORY**
C	**2.0**	**65 – 66**	
F	**0.0**	**60 – 64**	**FAIL**
F	**0.0**	**55 – 59**	
F	**0.0**	**50 – 54**	
F	**0.0**	**0 – 49**	
WF	**0.0**	**0**	**FAIL, withdrawal after deadline**

EVALUATIONS:

Theory portion will be made up of quizzes and tests worth 35%.
Shop portion will be made up of shop projects worth 65%.

Students who have successfully completed the program and also completed an acceptable Alberta Apprenticeship Prior Learning Assessment Application (fee payable to Alberta Apprenticeship) may have the opportunity to challenge the Alberta

Apprenticeship and Industry Training (AIT) first and second year Heavy Equipment Technician apprentice exam.

STUDENT RESPONSIBILITIES:

Please refer to the Student Rights and Responsibilities policy in the Grande Prairie Regional College Calendar or at www.gprc.ab.ca/downloads/documents/StudentRightsandResponsbilities.pdf

STATEMENT ON PLAGIARISM AND CHEATING:

Please refer to pages 49-50 of the College calendar regarding plagiarism, cheating and the resultant penalties. These are serious issues and will be dealt with severely.

COURSE SCHEDULE/TENTATIVE TIMELINE:

A. Electrical Theory ..... 6 Hours
Outcome: Apply scientific principles to explain electrical theory.
1. Explain the physical properties of conductors, semi-conductors and insulators.
2. Explain electricity in terms of voltage, current and resistance.
3. Explain direct current, alternating current and static electricity.

B. Electrical Circuits ..... 9 Hours
Outcome: Identify electrical circuit types and circuit defects.
1. List the components of a basic electrical circuit.
2. Explain the effects of circuit defects on circuit operation.
3. Identify the three circuit types and their properties.
4. Explain electrical laws and formulas that apply to the operation of electrical circuits.
5. Apply electrical laws and formulas to mathematically calculate circuit values.

C. Magnetism ..... 5 Hours
Outcome: Apply scientific principles to explain the theory of magnetism.
1. Explain the fundamental laws of magnetism.
2. Explain the properties and applications of permanent magnets.
3. Explain the construction, operation and application of electromagnets.
4. Explain the principles of electromagnetic induction.

D. Test Equipment ..... 10 Hours
Outcome: Use electrical test equipment to measure electrical values and check circuit operation.
1. Explain the construction and operation of voltmeters, ammeters and ohmmeters.
2. Explain meter precautions when measuring voltage, current and resistance.
3. Measure voltage at various points on a circuit and interpret the results.
4. Measure current flow at various points on a circuit and interpret the results.
5. Measure resistance using an ohmmeter.

E. Battery Fundamentals and Service .....10 Hours
Outcome: Service, test and charge a lead-acid battery.
1. Identify hazards encountered with lead-acid storage batteries.
2. Explain battery construction, sizing and capacity.

3. Perform battery maintenance and testing.
4. List safety precautions and procedures for boosting batteries.
5. List the safety precautions and procedures for charging batteries.
6. Explain multiple battery circuits in relation to connections and battery compatibility.

F. Electrical Wiring, Lighting Circuits and Circuit Protection ..... 24 Hours
Outcome: Test and repair electrical circuits.
1. Trace electrical circuits using symbols that are common to the industry.
2. Perform wiring harness inspection and repair.
3. Identify and repair wiring harness connectors that are common to the industry.
4. Test circuit protection devices, switches, relays and solenoids.
5. Repair an electrical lighting circuit for a short circuit, ground fault, open circuit and high resistance.

G. Basic Electronics .....16 Hours
Outcome: Test discrete electronic components used in the trade.
1. Compare and contrast solid state electronic and electrical circuitry.
2. Explain the properties, applications and test procedures for resistors.
3. Explain the properties, applications and test procedures for diodes.
4. Identify the conditions that affect the life of electronic devices.

H. Electronic Control Systems .....16 Hours
Outcome: Describe the operation of basic computer-controlled systems.
1. Identify the terminology commonly used with computer controls and components.
2. Explain the function of electronic control system components.
3. Explain the interaction between inputs, processors and outputs to control a circuit or a system.
4. Identify electronic test equipment used for diagnosis of electronic systems.