DEPARTMENT OF HEAVY EQUIPMENT PROGRAMS

COURSE OUTLINE – WINTER SEMESTER 2

HE 2500 HEAVY DUTY CHARGING AND CRANKING SYSTEMS – 6.5(100 HOURS/18 WEEKS) 25 LECTURE – 75 LAB/SHOP

INSTRUCTOR: Garry Candy **PHONE:** 780 835 6728

OFFICE: FTI 215 **E-MAIL:** gcandy@gprc.ab.ca

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 and 2nd Period Heavy Equipment Technician ILM Modules

CALENDAR DESCRIPTION:

Explain the operation of 12 and 24 volt charging systems. Diagnose and service 12 and 24 volt charging systems. Explain the operation of 12 and 24 volt cranking

systems. Explain the operation of cranking motor control circuits. Diagnose and service cranking systems. Service and maintain air and hydraulic cranking system

CREDIT/CONTACT HOURS: 6.5 Credits – 100 Contact Hours – 5 hours per week.

DELIVERY MODE(S): Instructor led classroom theory (25 hours), instructor led lab/shop (75 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. Charging System and Control Circuit Fundamentals ..... 18 Hours
Outcome: Explain the operation of 12 and 24 volt charging systems.
1. Explain the purpose of the charging system in relation to equipment operation.
2. Identify charging system components.
3. Describe the operational characteristics of an alternator.
4. Identify and state the function of common alternator components.
5. Describe the operation of an alternator in regards to induction, rectification and output control.
6. Identify and state the function of common alternator components.
7. Identify common regulator types and designs.
8. State the purpose of auxiliary terminals on integrally regulated alternators.
9. Explain the operation of charging system indicator circuits.

B. Charging System Testing and Service ..... 38 Hours
Outcome: Diagnose and service 12 and 24 volt charging systems.
1. Perform on-equipment charging system tests.
2. Demonstrate the procedure to bench test an alternator for output and voltage control.
3. Identify alternator defects.
4. Demonstrate charging system maintenance procedures.

C. Cranking System Fundamentals and Motor Drives ..... 7 Hours
Outcome: Explain the operation of 12 and 24 volt cranking systems.
1. Identify components of a typical cranking system.
2. Describe the principles of operation of a cranking motor.
3. Identify cranking motor construction in regards to electrical design.
4. Identify and state the function of common cranking motor components.
5. Identify and explain the operation of overrunning clutch type motor drives.
6. Explain operational limitations of a cranking motor.

D. Cranking System Control Circuits ..... 6 Hours
Outcome: Explain the operation of cranking motor control circuits.

1. Trace a starting system circuit diagram.
2. Explain the operation of a cranking motor solenoid switch.
3. Explain the operation of a magnetic switch.