DEPARTMENT OF HEAVY EQUIPMENT

HEAVY EQUIPMENT SERVICE COURSE OUTLINE – WINTER 2014

MARCH 3 – APRIL 25, 2014

HES521 – MACHINE/ENGINE DIAGNOSTICS/REPAIR – 5.0 (144 HOURS)

INSTRUCTOR: Richard Byam
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OFFICE HOURS: 8.00am to 4.30pm

PREREQUISITE(S)/COREQUISITE: Successful completion of Semesters 1 through 4.

REQUIRED TEXT/RESOURCE MATERIALS:

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

190404f – Alberta's Industry Network
190404g – Interprovincial Standards Red Seal Program

Caterpillar Material

***Machine Electronics**:*

Unit 1: Machine Electronic Components.
Lesson 1 – Electronic Control System Components.
Unit 2: Electronically Controlled Engines.
Lesson 1 – CAT Engine History
Lesson 2 – EUI.
Lesson 3 – HEUI.
Unit 3: Caterpillar Electronic Technician.
Lesson 1 through Lesson 9.
Unit 4: Monitoring Systems.
Lesson 1 through Lesson 4.

Caterpillar Service Industry continued . . .

Machine Diagnostics*:*

Unit 1: Introduction to Diagnostics and Troubleshooting.

Lesson 1 – Troubleshooting Process.

Lesson 2 – Diagnostic Resources.

Lesson 3 – Applied Failure Analysis.

Unit 2: Power Train Diagnostics.

Power Train Diagnostic Principles.

Unit 3: Hydraulic Systems Diagnostics.

Hydraulic Systems Diagnostic Principles.

Unit 4: Electrical Systems Diagnostics.

Electrical Systems Diagnostic Principles.

Engine Diagnostics and Repair:

Unit 1: Diagnosis and Troubleshooting.

Lesson 1 – Diagnosis and Troubleshooting.

Unit 2: Engine Oil and Lubrication Systems.

Lesson 1 – Introduction to Engine Oil.

Lesson 2 – Engine Lubrication Systems.

Lesson 3 – Lubrication System Testing and Troubleshooting.

Unit 3: Engine Air Induction Systems.

Lesson 1 – Introduction to Air Induction Systems.

Lesson 2 – Caterpillar Air Induction System Testing.

Lesson 3 – Air System Troubleshooting.

Unit 4: Engine Cooling Systems.

Lesson 1 – Introduction to Cooling Systems.

Lesson 2 – Cooling System Calculations.

Lesson 3 – Cooling System Troubleshooting.

Lesson 4 – Cooling System Maintenance.

Unit 5: Engine Fuel Systems.

Lesson 1 – Fuel System Inspection and Testing.

Lesson 2 – Fuel System Calibration and Monitoring

Lesson 3 – Engine Timing.

Caterpillar Service Industry continued . . .

Machine Hydraulics Systems*:*

Unit 1: LS/PC Hydraulic Systems.
Unit 2: PPPC Hydraulic Systems
Unit 3: NFC Hydraulic Systems
Unit 4: Hydrostatic Systems.
As per available units.

Machine Specific:
As per available units.

CALENDAR DESCRIPTION: Primarily a lab based course where the student's knowledge will be challenged and troubleshooting skills developed. Students will be required to successfully diagnose a series of equipment faults in a real world setting.

CREDIT/CONTACT HOURS: Credits: 5.0 / Contact Hours: 144.

DELIVERY MODE(S): Primarily lab based.

TRANSFERABILITY: None

GRADING CRITERIA: Students must complete all required courses with a grade point average of no less than 2.7 and no failing (F) grades. A passing grade in this course is a **minimum of 70%.**

HES521 Machine / Engine Diagnostics / Repair ..... 144/240 hours = 60 % of Semester 5 mark

Exams Average = _____ **x 45%**

Class Assignments/Quizzes = _____ **x 30%**

Shop Total _____ **x 25%**

HES 521 FINAL MARK = _____ %

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**	
F	**0.0**	**67 – 69**	**FAIL**
F	**0.0**	**63 – 66**	
F	**0.0**	**60 – 62**	
F	**0.0**	**55 – 59**	
F	**0.0**	**50 – 54**	
F	**0.0**	**0 – 49**	
WF	**0.0**	**0**	**FAIL, withdrawal after the deadline**

STUDENT RESPONSIBILITIES:

This is an adult education environment. Enrolment at Grande Prairie Regional College assumes that the student will become a responsible citizen of the College. 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.

Following the guidelines in "Student Rights and Responsibilities" in the GPRC College calendar assist us all in maintaining an adult learning environment. Please refer to the Student Rights and Responsibilities policy in the Grande Prairie Regional College Calendar or at www.gprc.ab.ca/downloads/documents/StudentRightsandResponsibilities.pdf.

STATEMENT ON PLAGIARISM AND CHEATING:

Refer to the Student Conduct section of the GPRC Calendar at http://www.gprc.ab.ca/programs/calendar/ Pages 44 to 46 or the College Policy on Student Misconduct: Plagiarism and Cheating at http://www.gprc.ab.ca/about/administration/policies/. **

**Note: all Academic and Administrative policies are available on the same page.

COURSE SCHEDULE/TENTATIVE TIMELINE:

Machine Electronics

- Machine Electronic Components
- Electronically Controlled Engines
- CAT ET
- Monitoring Systems
- Data View

Machine Diagnostics

- Introduction to Diagnostics and Troubleshooting
- Power Train Diagnostics
- Hydraulic Systems Diagnostics
- Electrical System Diagnostics

Engine Diagnostics and Repair

- Diagnosis and Troubleshooting
- Engine Oil and Lubrication Systems
- Engine Air Induction Systems
- Engine Cooling Systems
- Engine Fuel Systems

Machine Specific

- 950G II Electro Hydraulic Control System.
- Compact Construction Equipment.
- 325C Excavator.
- 312C/ 315C Hydraulic Excavator.
- Off Highway trucks.
- Articulated Dump Truck.
- 620G Series Wheel Tractor Scrapers.
- H Series Motor Graders.
- Gas Engines.
- EPG Engines.
- Marine Engines.
- Paving Products.