SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE:	**HEAVY EQUIPMENT III SHOP**		
CODE NO. :	HED201	**SEMESTER:**	3
PROGRAM:	Truck and Coach / Heavy Duty Equipment Technician		
AUTHOR:	George Parsons		
DATE:	June 2008	**PREVIOUS OUTLINE DATED:**	May 2007
APPROVED:	**"Corey Meunier" CHAIR**		**Jul 18 08 DATE**
TOTAL CREDITS:	9		
PREREQUISITE(S):	HED111		
HOURS/WEEK:	8 HRS / 15 WKS		

I. COURSE DESCRIPTION:

This hands-on shop course compliments and reinforces the theory taken in HED200-8 during the fall, third semester. The course content requires the student to independently perform a variety of shop assignments and communicate clearly and correctly the diagnostics, the objective, service procedure and specifications in summarized, written service reports. In addition to previously taught content, the student will work on hydraulic, electrical and fuel injection tasks as demonstrated through the semester. Demonstrated skills learned in this course will assist the student in a wide scope of trade related employment including the trucking, agricultural, construction, material handling, mining, forestry, railway, equipment rental and equipment dealership industries.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Support mobile and stationary hydraulic systems and circuits by competently diagnosing, repairing / replacing components, analyzing failure causes, removing problems and testing and adjusting to ensure efficient hydraulic performance.

   Potential Elements of the Performance:

   - Identify basic hydraulic components, their purpose and function in a typical hydraulic system.
   - Remove, assemble and replace hydraulic hoses.
   - Disassemble, inspect and identify hydraulic pumps.
   - Disassemble, inspect and repack hydraulic cylinders.
   - Disassemble, inspect and identify the operation of hydraulic directional control valves and optional valving and purpose.
   - Examine and identify flow control, pressure reducing, sequence, and holding valves and their circuit locations and purpose.
   - Perform meter flow testing, time circuit time cycles, pressure test primary and secondary relief valve settings and adjust to specifications.

2. Perform electrical diagnostic tasks with multimeters, test lamps and equipment to support the mobile equipment industry, identify faults, causes and repair / replace parts and components that make up cranking, charging and accessory electrical circuits.

   Potential Elements of the Performance:

   - Measure voltage drops, amperage and resistance values of various circuits.
   - Perform safe battery charging techniques, load testing and charge testing procedures, and safe boosting procedures.
   - Disassemble, inspect and identify the operating principles of Brush and brushless alternators, external and internally Regulated, then reassemble and load test.
   - Identify the operating principles of electrical, air and hydraulic cranking motors.
   - Perform cranking cable voltage drop tests, starter control circuit tests including crank inhibit devices.
   - Perform heavy duty electrical circuit troubleshooting procedures for entire cranking, charging and accessory circuits.

3. Maintain diesel fuel supply and fuel injection systems in the commercial vehicle and stationary power industries.

   Potential Elements of the Performance:

   - Inspect and identify fuel supply components including reservoirs, water traps and drains, primary filters, water separators, heaters, charge pumps, hand primers, regulating valves, secondary filters, bleeders and charge pressure tap points for a variety of diesel engines.
   - Perform torque, dial indicator, and zero-lash tune-ups and cam timing on pressure-time mechanical injected engines.
   - Test and adjust low and high idle and snap throttle pressure on PTG fuel pumps.
   - Perform static pin timing, low and high pressure spill port timing of in-line multiplunger injection pumps.
   - Identify hydraulic open and closed injectors, pop test and adjust opening pressures, and test for tip and back leakage, distribution patterns and chatter.
   - Perform diagnostic tests of injection pump and injectors on live engines.
   - Isolate a short or overfueled unit injector on a two-stroke diesel and correct condition with proper overhead tune up.
   - Test charge pressure and recommend proper servicing of a

two-stroke diesel injection system.
- Inspect and adjust fuel injection timing of various rotary injection pumps on various diesel engines.

III. TOPICS:

1. Hydraulics
2. Electrical Basics, Meters, Charging and Cranking Systems
3. Fuel Supply Systems
4. Diesel Fuel Injection and Engine Maintenance

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Vickers Mobile Hydraulics Manual
Heavy Duty Truck Systems 4th edition
Diesel Technology Fundamentals / Service / Repair
Diesel Technology Workbook
Shop Assignment Sheet Protector
Pens, pencils
Approved Safety Glasses, Approved Safety Boots, and Coveralls

V. EVALUATION PROCESS/GRADING SYSTEM:

The Heavy Equipment Program considers both HED200-13 Theory and HED201-9 Shop to be *co-requisites.* Students must successfully complete both courses in the same semester.

Shop grade assessment is based on two criteria;

- 70% on project or shop assignments and on the students ability as measured subjectively by performance on a variety of shop work.
- 30% on employability skills; attendance, punctuality, preparedness, housekeeping, work organization, and general attitude.

The following semester grades will be assigned to students:

Grade	**Definition**	*Grade Point Equivalent*
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical

	placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Retention of Course Outlines:
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Communication:
The College considers ***WebCT/LMS*** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the ***Learning Management System*** communication tool.

Plagiarism:
Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:
The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. ADVANCE CREDIT TRANSFER:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.