

I. COURSE DESCRIPTION:

This hands-on shop course compliments and reinforces the theory taken in HED 101 during the same semester. The student is required to perform a wide variety of shop assignments and projects that will later assist the graduate in trade related employment in the heavy equipment and trucking industries. The student will start from basic identification of hand and power tools, fastener grades and torque relationships, tap and drill exercises and work towards a full diesel engine overhaul and start up during this semester. Additional assignments include powered lift truck operating, top end tune ups on a variety of diesel engines, and maintaining our heavy equipment and truck fleet.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

- 1. Select and safely use a wide variety of hand and power tools that the heavy equipment and trucking industries require on a day to day basis.**

Potential Elements of the Performance:

- Responsibly identify and inventory tool box contents.
- Identify the shop layout, and implement a fire prevention and fire fighting strategy.
- Recognize standard and metric fasteners, tensile grade markings and the relative torque values and tools required to properly achieve assembly integrity.
- Calculate final fastener torque using torque multipliers and extensions, as well as torque turn procedures and torque sequences.
- Accurately sharpen drill bits.
- Use tap and die tools and select relative drill sizes from charts.
- Install thread repair products.
- Select the safe cleaning method and procedure for a variety of equipment and components.
- Use inside, depth and outside dimension precision measuring instruments.
- Remove, prepare and correctly install anti-friction bearings and lip seal assemblies.
- Use single and double flaring tools correctly.

2. **Inspect, safely operate and maintain a variety of powered lift trucks.**

Potential Elements of the Performance:

- Perform a daily equipment inspection.
- Operate each unit with a brake test, rear swing consideration, correct travel direction and stacking maneuvers.
- Refuel propane and diesel units, and recharge electric lift.
- Use a variety of nylon slings, cables, chains, spreaders, clevises, and levelers for a number of lifting tasks.
- Identify load ratings of both truck and lifting accessories.

3. **Operate a variety of starting aids and cranking methods for direct and indirect injection diesel engines and equipment.**

Potential Elements of the Performance:

- Perform pre-operating and pre-start equipment and engine inspections.
- Use glow plug, manifold pre-heat, auxiliary engines and heaters, isolation clutches and valves, and ether accessories safely.
- Use lockouts and warning tags on unsafe units.

4. **Perform top end tune-ups on a variety of four stroke/cycle in-line and V-configuration diesel engines..**

Potential Elements of the Performance:

- Recognize valve overlap and firing orders.
- Adjust valves and bridges to manufacturer's specifications.

5. **Perform a heavy duty diesel engine disassembly and inspection.**

Potential Elements of the Performance:

- Organize and housekeep an appropriate tear down area.
- Measure crankshaft end-play prior to disassembly.
- Use a variety of nondestructive marking aids.
- Prepare a service report and unit pictures prior to teardown.
- Follow an approved disassembly service guide.
- Mark, remove, inspect, measure and assess each part and component, clean and protect during the process.

6. **Re-assemble and start a heavy duty diesel engine.**

Potential Elements of the Performance:

- Follow an approved manufacture's re-assembly guide.
- Use approved sealants, lubricants, installation tools, torque procedures and sequences for component re-assembly.
- Time the camshaft, fuel injection components, auxiliary drives and balancers, and adjust backlash and valves.
- Pre-lube and leak test prior to start up

III. TOPICS:

1. Shop Safety
2. Hand and power tools
3. Fasteners
4. Measuring tools
5. Lift Truck Safety
6. Internal combustion engine fundamentals
7. Diesel starting aids and methods
8. Two and four stroke diesel construction and operation
9. Diesel engine overhaul process

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

The same booklist from HED 101 Theory will be used for reference.

Pen, Pencil

Safety Work Boots (CSA approved – high cut)

Safety Glasses (CSA approved and impact resistant)

Coveralls (non flammable material – i.e. cotton)

V. EVALUATION PROCESS/GRADING SYSTEM:

The Heavy Equipment Program considers both HED 101-10 Theory and HED100-9 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%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
	Failure – the student has not achieved the objectives of the course and the course must be repeated.	

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 703 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.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. 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:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.