

CALENDAR DESCRIPTION:

Explain the operating principles and design features of two and four stroke internal combustion engines. Describe the functions and design features of cylinder block assemblies. Service a piston and connecting rod assembly. Describe the functions and design features of pistons, piston rings and connecting rods. Inspect an engine block assembly for serviceability. Describe the functions and design features of pistons, piston rings and connecting rods. Service a piston and connecting rod assembly. Service crankshafts, friction bearings and related components. Describe the functions and design features of crankshafts and their related components. Describe the functions and design features of camshafts and related components. Service camshaft and related components. Service cylinder heads and valve train components. Describe the functions and design features of cylinder heads and valve train components. Explain the operation of engine compression and exhaust brakes.

CREDIT/CONTACT HOURS: 9 Credits – 140 Contact Hours – 8 hours per week

DELIVERY MODE(S): Instructor led classroom theory (40 hours), instructor led lab/shop (100 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/StudentRightsandResponsibilities.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. Engine Fundamentals 8Hours

Outcome: Explain the operating principles and design features of two and four stroke internal combustion engines.

1. Explain the stages of development of the internal combustion engine.
2. Explain common engine terms and definitions.
3. Explain common methods of classifying engines.
4. Explain the principles of operation for two and four stroke cycle engines.
5. Compare diesel and gasoline engine operation.

B. Engine Block and Cylinder Liner Fundamentals 8 Hours

Outcome: Describe the functions and design features of cylinder block assemblies.

1. State the functions of the engine cylinder block.
2. Identify cylinder block construction and design features.
3. Describe the construction and design features of removable cylinder liners.

C. Engine Block and Cylinder Liner Service 14 Hours

Outcome: Inspect an engine block assembly for serviceability.

1. Inspect engine block for cracks, thread, bearing bore and machined surface condition.
2. Explain cylinder block repair procedures for cracks, threads, bearing bores and machined surfaces.
3. Explain inspection and reconditioning procedures for a cylinder block with integral cylinders.
4. Perform removable cylinder liner service.

D. Piston, Piston Rings and Connecting Rod Fundamentals 8 Hours

Outcome: Describe the functions and design features of pistons, piston rings and connecting rods.

1. Explain the function, construction and design features of pistons and piston pins.
2. Explain the function, construction and design features of piston rings.
3. Explain the function, construction and design features of connecting rods.

E. Piston, Piston Rings and Connecting Rod Service 14 Hours

Outcome: Service a piston and connecting rod assembly.

1. Remove and disassemble piston and connecting rod assemblies.
2. Inspect piston and pin for reuse.
3. Explain connecting rod service procedures.
4. Install piston and connecting rod assemblies.

F. Crankshaft, Bearings and Related Component Fundamentals 10 Hours

Outcome: Describe the functions and design features of crankshafts and their related components.

1. Explain the function and design features of crankshafts.
2. Explain methods used to achieve engine balance.
3. State the functions of crankshaft seals, gears and flywheels.
4. Describe the function and design features of friction bearings specific to engines.
5. Explain the lubrication principles of engine friction bearings.

G. Crankshaft, Bearings and Related Component Service 14Hours

Outcome: Service crankshafts, friction bearings and related components.

1. Remove crankshaft and bearings from an engine block.
2. Inspect and measure crankshafts to determine serviceability.
3. Inspect flywheel and vibration damper to determine serviceability.
4. Identify common crankshaft and bearing failures.
5. Install crankshafts and related components.

H. Camshaft and Follower Fundamentals 10 Hours

Outcome: Describe the functions and design features of camshafts and related components.

1. Explain the function and design features of camshafts, camshaft bearings and seals.
2. Explain the function and design features of camshaft followers.
3. Explain camshaft drive mechanisms and timing.

I. Camshaft and Follower Service 14 Hours

Outcome: Service camshaft and related components.

1. Remove camshaft and related components from an engine block.
2. Inspect and measure camshafts and related components to determine serviceability.
3. Install camshaft and related components.

J. Cylinder Head Fundamentals 12 Hours

Outcome: Describe the functions and design features of cylinder heads and valve train components.

1. Explain the function, construction and design features of cylinder heads.
2. Describe the construction and design features of engine valves and related components.
3. Describe the construction and design features of valve train components.
4. Identify cylinder head sealing and retention devices.

K. Cylinder Head Service19 Hours

Outcome: Service cylinder heads and valve train components.

1. Demonstrate cylinder head removal and disassembly.
2. Clean and inspect cylinder heads.
3. Explain cylinder head and valve reconditioning procedures.
4. Inspect valve train components.
5. Demonstrate cylinder head assembly and installation.

L. Engine Braking System Fundamentals and Service..... 9 Hours

Outcome: Explain the operation of engine compression and exhaust brakes.

1. State the function of an engine brake.
2. Explain the operation of an engine compression brake.
3. Explain basic adjustment and diagnosis of an engine compression brake.
4. Explain the functions and operation of an engine exhaust brake.