



## COURSE OUTLINE: MPT203 - INTERN.COMB.ENG. II

Prepared: Stephen Kent

Approved: Corey Meunier, Chair, Technology and Skilled Trades

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| <b>Course Code: Title</b>                                                                                                                                                  | MPT203: INTERNAL COMBUSTION ENGINES II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Program Number: Name</b>                                                                                                                                                | 4044: MOT POWER ADV REPAIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Department:</b>                                                                                                                                                         | MOTIVE POWER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Semesters/Terms:</b>                                                                                                                                                    | 19F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Course Description:</b>                                                                                                                                                 | <p>In this course, you will be exposed to common machine shop and reconditioning operations for engine crankshafts, connecting rods, cylinder block and cylinder heads. You will have a sound understanding of engine lubrication and cooling system diagnosis. Emphasis will be placed on students acquiring practical skills for internal and external engine repair procedures such as: engine timing component replacement, valve train service, cylinder head and gasket repairs, cooling and lubrication system repair and engine accessory component diagnosis.</p> <p>Students will be required to follow proper safety procedures when performing the above tasks according to both Sault College Motive Power Department Standards and Vehicle Manufacturers safety regulations and specifications.</p>                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Total Credits:</b>                                                                                                                                                      | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hours/Week:</b>                                                                                                                                                         | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Total Hours:</b>                                                                                                                                                        | 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Prerequisites:</b>                                                                                                                                                      | MPF101, MPF103                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Corequisites:</b>                                                                                                                                                       | There are no co-requisites for this course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Vocational Learning Outcomes (VLO's) addressed in this course:</b><br><br>Please refer to program web page for a complete listing of program outcomes where applicable. | <p><b>4044 - MOT POWER ADV REPAIR</b></p> <p>VLO 1 Analyse, diagnose, and solve various motive power system problems by using problem-solving and critical thinking skills and strategies and by applying fundamental knowledge of motor vehicle operation, components, and their interrelationships.</p> <p>VLO 3 Diagnose and repair engine systems in compliance with manufacturer's recommendations.</p> <p>VLO 7 Disassemble and assemble components to required specifications by applying workshop skills and knowledge of basic shop practices.</p> <p>VLO 8 Select and use a variety of troubleshooting techniques and test equipment to assess electronic circuits, vehicle systems, and subsystems.</p> <p>VLO 10 Communicate information effectively, credibly, and accurately by producing supporting documentation to appropriate standards.</p> <p>VLO 11 Use information technology and computer skills to support work in a motive power environment.</p> <p>VLO 16 Complete all assigned work in compliance with occupational, health, safety, and environmental law; established policies and procedures; codes and regulations; and in accordance with ethical principles.</p> |
| <b>Essential Employability Skills (EES) addressed in</b>                                                                                                                   | <p>EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



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| <b>this course:</b>                                           | <p>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>EES 3 Execute mathematical operations accurately.</p> <p>EES 4 Apply a systematic approach to solve problems.</p> <p>EES 5 Use a variety of thinking skills to anticipate and solve problems.</p> <p>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>EES 10 Manage the use of time and other resources to complete projects.</p> <p>EES 11 Take responsibility for ones own actions, decisions, and consequences.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Course Evaluation:</b>                                     | Passing Grade: 50%, D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Other Course Evaluation &amp; Assessment Requirements:</b> | <p>V. EVALUATION PROCESS/GRADING SYSTEM:</p> <p>The final grade for this course will be based on the results of classroom, assignments and shop evaluations weighed as indicated:</p> <p>Classroom 35% of the final grade is comprised of term tests</p> <p>Assignments 10% of the final grade is comprised of a number of technical reports</p> <p>Shop 45% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude</p> <p>Employability Skills 10% of final grade is comprised of attendance, class participation, show ability to follow direction and being a team player.</p> <p>(Student will be given notice of test and assignment dates in advance)</p> <p>NOTE: All assignments will be in typed format. NO hand written assignments will be accepted.</p> <p>The following semester grades will be assigned to students:</p> <p>Grade<br/>Definition Grade Point Equivalent</p> <p>A+ 90 - 100% 4.00</p> <p>A 80 - 89%</p> <p>B 70 - 79% 3.00</p> <p>C 60 - 69% 2.00</p> <p>D 50 59% 1.00</p> <p>F (Fail)49% and below 0.00</p> <p>CR (Credit) Credit for diploma requirements has been awarded.</p> <p>S Satisfactory achievement in field /clinical placement or non-graded subject area.</p> <p>U Unsatisfactory achievement in field/clinical placement or non-graded subject area.</p> <p>X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.</p> <p>NR Grade not reported to Registrar's office.</p> <p>W Student has withdrawn from the course without academic penalty.</p> |

**Books and Required Resources:**

Automotive Technology: A Systems Approach by Erjavec  
Publisher: Thomson Nelson Learning Canada Edition: 3rd Canadian

Medium/Heavy Duty Truck Engines, Fuel and Computerized Management Systems by Bennet  
Publisher: Cengage Learning Edition: 5th edition

**Course Outcomes and Learning Objectives:**

| Course Outcome 1                                                             | Learning Objectives for Course Outcome 1                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Discuss the purpose and fundamentals of camshaft and valve train assemblies. | <ul style="list-style-type: none"><li>• Define valve lead, lag, overlap, and duration</li><li>• Explain the relationship of valves to position of pistons</li><li>• Draw and interpret a valve timing events diagram</li><li>• Describe lifters, solid, hydraulic and roller design</li><li>• Outline rocker arms and push rods</li><li>• Compare and contrast overhead valve to overhead camshaft design engines</li></ul> |
| Course Outcome 2                                                             | Learning Objectives for Course Outcome 2                                                                                                                                                                                                                                                                                                                                                                                    |
| Describe the types styles and application of valve trains.                   | <ul style="list-style-type: none"><li>• Outline different types of drive mechanisms chains, belts, gears and sprockets</li><li>• Explain purpose of manufacturing engines with overhead camshafts</li><li>• Describe in block camshaft engine operation including push rods, lifters and rocker arms</li></ul>                                                                                                              |
| Course Outcome 3                                                             | Learning Objectives for Course Outcome 3                                                                                                                                                                                                                                                                                                                                                                                    |
| Perform recommended service operations.                                      | <ul style="list-style-type: none"><li>• Remove and install timing belts and chains</li><li>• Perform valve adjustment on a variety of styles</li><li>• Compression test</li><li>• Cylinder leakage test.</li><li>• Measure valve lift and duration</li><li>• Vacuum test</li><li>• Check gear and pump timing on Diesel engines</li></ul>                                                                                   |
| Course Outcome 4                                                             | Learning Objectives for Course Outcome 4                                                                                                                                                                                                                                                                                                                                                                                    |
| Describe common engine machine shop reconditioning equipment and procedures. | <ul style="list-style-type: none"><li>• Inspect component gasket surfaces for nicks, burrs and warping</li><li>• Outline proper gasket sealing techniques used in the motive power engine repair industry</li><li>• Observe the reconditioning operations for:<ul style="list-style-type: none"><li>o cylinder blocks</li><li>o crankshafts</li><li>o connecting rods</li><li>o cylinder heads</li></ul></li></ul>          |
| Course Outcome 5                                                             | Learning Objectives for Course Outcome 5                                                                                                                                                                                                                                                                                                                                                                                    |
| Diagnose cooling systems.                                                    | <ul style="list-style-type: none"><li>• Perform a leak test</li><li>• Test thermostat for opening temperature</li><li>• Test PH and freeze point</li><li>• Flush system</li><li>• Check for combustion signs in cooling system</li><li>• Test and service SCAs in Diesel engines cooling systems</li><li>• Have a clear understanding of the importance of testing PH &amp; SCAs</li></ul>                                  |
| Course Outcome 6                                                             | Learning Objectives for Course Outcome 6                                                                                                                                                                                                                                                                                                                                                                                    |



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|                                               | Diagnose lubrication systems.                                                                                                                                                                                                                     | <ul style="list-style-type: none"><li>• Test oil pressure</li><li>• Check for oil contamination</li><li>• Check for leaks</li><li>• Describe proper leak testing techniques</li><li>• Replace oil and filters</li><li>• Outline oil requirements, API ratings</li></ul> |                 |                   |             |     |                      |     |      |     |              |     |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|-------------|-----|----------------------|-----|------|-----|--------------|-----|
| <b>Evaluation Process and Grading System:</b> | <table><tr><th>Evaluation Type</th><th>Evaluation Weight</th></tr><tr><td>Assignments</td><td>10%</td></tr><tr><td>Employability Skills</td><td>10%</td></tr><tr><td>shop</td><td>45%</td></tr><tr><td>Theory Tests</td><td>35%</td></tr></table> |                                                                                                                                                                                                                                                                         | Evaluation Type | Evaluation Weight | Assignments | 10% | Employability Skills | 10% | shop | 45% | Theory Tests | 35% |
| Evaluation Type                               | Evaluation Weight                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |
| Assignments                                   | 10%                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |
| Employability Skills                          | 10%                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |
| shop                                          | 45%                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |
| Theory Tests                                  | 35%                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |
| <b>Date:</b>                                  | August 28, 2019                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |
| <b>Addendum:</b>                              | Please refer to the course outline addendum on the Learning Management System for further information.                                                                                                                                            |                                                                                                                                                                                                                                                                         |                 |                   |             |     |                      |     |      |     |              |     |

