



## COURSE OUTLINE: AST611 - WORK PRACTICES

Prepared: Stephen Kent

Approved: Corey Meunier, Chair, Technology and Skilled Trades

|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Code: Title</b>                                             | AST611: WORK PRACTICES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Program Number: Name</b>                                           | 6067: AUTO SERV TN LEVEL I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Department:</b>                                                    | MOTIVE POWER APPRENTICESHIP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Semesters/Terms:</b>                                               | 19F, 20W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Course Description:</b>                                            | <p>In this course, the student will demonstrate the ability to identify types and purpose of fasteners including tightening procedures. The student will be introduced to bearings, seals and sealants and the purpose of each. The student will demonstrate a working knowledge of the purpose, construction, principles of operation, and calibration of precision and non-precision measuring tools. They will also show their ability to properly lift and support vehicles using hoists and lifting equipment. Oxyacetylene, heating and cutting will also be performed as well as producing word documents and accessing trade related information from computer based software.</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>                                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Total Hours:</b>                                                   | 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Prerequisites:</b>                                                 | There are no pre-requisites for this course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Corequisites:</b>                                                  | There are no co-requisites for this course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Essential Employability Skills (EES) addressed in this course:</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> <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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

**Other Course Evaluation & Assessment Requirements:**

The final grade for this course will be based on the results of classroom, assignments and shop evaluations weighed as indicated:

Classroom 70% of the final grade is comprised of term tests

Shop 30% of the final grade is comprised of attendance, punctuality, preparedness, student ability, work organization and general attitude

Students will be given notice of test and assignment dates in advance

**Books and Required Resources:**

Automotive Technology: A Systems Approach by Erjavec

Publisher: Thomson Nelson Learning Canada Edition: 3rd Canadian

**Course Outcomes and Learning Objectives:**

| Course Outcome 1                                                                                                              | Learning Objectives for Course Outcome 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Define the purpose and fundamentals of fasteners and perform fastener selection, retention, removal and tightening procedures | <p>1.1 Explain the fundamental characteristics of fasteners and retention techniques as to the following.</p> <ul style="list-style-type: none"><li>specifications created by Society of Automotive Engineers (SAE) standards</li><li>specifications of International Organization of Standards (ISO)</li><li>bolt strength (tensile, shear)</li><li>fastener grade, pitch, threads per inch, threads per millimeter</li><li>fastener diameter, length, head size</li><li>use of anti-seize application</li><li>• factors that affect torque</li></ul> <p>thread condition</p> <p>lubrication</p> <p>compatibility</p> <p>temperature</p> <p>fastener compositio</p> <p>1.2 Identify the construction, types, styles and application of the following fasteners.</p> <ul style="list-style-type: none"><li>bolts / nuts</li><li>screws</li><li>studs</li><li>locking devices</li><li>pins</li><li>rivets</li><li>keys</li><li>washers</li><li>retaining rings</li><li>helicoils, timeserts</li><li>thread sealants</li></ul> <p>1.3 Describe fastener applications, retention techniques and metal working skills.</p> <ul style="list-style-type: none"><li>thread lockers</li><li>torque to yield fasteners</li><li>torque effects of wet, dry and clean threads</li><li>locking techniques</li><li>drilling</li><li>tapping</li><li>hack sawing</li><li>filing</li><li>riveting</li></ul> |



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

|                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                        | <p>1.4 Perform the following metal working operations.</p> <p>verify thread strengths and torque requirements for wet and dry</p> <p>repair damaged threads</p> <p>free seized threads, remove broken studs / cap screws</p> <p>install helicoils and timeserts</p> <p>apply thread locker and anti-seize</p> <p>perform metal working tasks related to</p> <p>drilling</p> <p>tapping</p> <p>hack sawing</p> <p>filing</p> <p>riveting</p> <p>fastener torqueing</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Course Outcome 2</b>                                                                                                | <b>Learning Objectives for Course Outcome 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Demonstrate the purpose, construction, principals of operation, inspection and testing of bearings, seals and sealants | <p>2.1 Explain the following fundamentals.</p> <p>friction characteristics</p> <p>effects of temperature</p> <p>lubrication</p> <p>bearing loads</p> <p>axial / radial</p> <p>pre-load and end play</p> <p>hydrodynamic suspension</p> <p>2.2 Identify the purpose, construction and applications of bearings, seals and sealants.</p> <p>friction bearings</p> <p>anti-friction bearings</p> <p>ball</p> <p>roller</p> <p>needle</p> <p>Seals</p> <p>dynamic</p> <p>static</p> <p>sealants</p> <p>anaerobic</p> <p>non-anaerobic</p> <p>gaskets</p> <p>specialty sealants</p> <p>2.3 Describe cause of failure of bearings, seals and sealants.</p> <p>scoring / spalling</p> <p>clearance</p> <p>over-heating</p> <p>vibration</p> <p>lubrication</p> <p>2.4 Perform bearing, seal and sealant removal, installation.</p> <p>remove / install bearings -</p> <p>non-friction</p> <p>friction</p> <p>remove / install seals -</p> <p>dynamic</p> <p>static</p> |



|  |                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                                                                                                       | <p>2.5 Explain the following fundamentals.</p> <ul style="list-style-type: none"> <li>friction characteristics</li> <li>effects of temperature</li> <li>lubrication</li> <li>bearing loads</li> <li>axial / radial</li> <li>pre-load and end play</li> <li>hydrodynamic suspension</li> </ul> <p>2.6 Identify the purpose, construction and applications of bearings, seals and sealants.</p> <ul style="list-style-type: none"> <li>friction bearings</li> <li>anti-friction bearings</li> <li>ball</li> <li>roller</li> <li>needle</li> <li>Seals</li> <li>dynamic</li> <li>static</li> <li>sealants</li> <li>anaerobic</li> <li>non-anaerobic</li> <li>gaskets</li> <li>specialty sealants</li> </ul> <p>2.7 Describe cause of failure of bearings, seals and sealants.</p> <ul style="list-style-type: none"> <li>scoring / spalling</li> <li>clearance</li> <li>over-heating</li> <li>vibration</li> <li>lubrication</li> </ul> <p>2.8 Perform bearing, seal and sealant removal, installation.</p> <ul style="list-style-type: none"> <li>remove / install bearings -</li> <li>friction</li> <li>non friction</li> <li>remove / install seals -</li> <li>dynamic</li> <li>static</li> <li>remove and install sealants and gaskets</li> </ul> |
|  | <b>Course Outcome 3</b>                                                                                                                               | <b>Learning Objectives for Course Outcome 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|  | Demonstrate a working knowledge of the purpose, construction, principals of operation, and calibration of precision and non-precision measuring tools | <p>3.1 Explain Unit conversions</p> <p>Convert between metric and Imperial measurements including fractions.</p> <p>3.2 Identify the construction, types and application of precision measuring tools.</p> <ul style="list-style-type: none"> <li>micrometers</li> <li>inside</li> <li>outside</li> <li>depth</li> <li>small hole gauges</li> <li>calipers</li> <li>Vernier calipers</li> <li>telescoping gauges</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

|  |                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                                                                                              | straight edges<br>dial indicators<br>torque wrenches<br>straight edges<br>cylinder gauges<br><br>3.3 Describe measuring procedures using the following tools.<br>micrometers<br>inside<br>outside<br>depth<br>small hole gauges<br>calipers<br>Vernier calipers<br>telescoping gauges<br>straight edges<br>thickness gauges<br>dial indicators<br>straight edges<br>cylinder gauges<br>torque wrenches<br><br>3.4 Perform maintenance and calibration on precision measuring tools and perform precision measurements.<br>describe maintenance / calibration procedure<br>storage<br>lubrication<br>adjustment / calibration<br>restoring critical surfaces<br>perform measurement and clearance checks |
|  | <b>Course Outcome 4</b>                                                                                      | <b>Learning Objectives for Course Outcome 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | Apply a working knowledge and safe operating principals for the use of oxyacetylene when cutting and heating | 4.1 Explain the functions, construction, and applications of oxyacetylene welding equipment.<br>tanks<br>identification features<br>pressure regulators<br>manual valves<br>gauges<br>torch tips<br>heating and cutting torches<br><br>4.2 Describe the safe use of oxy-acetylene equipment.<br>personal safety equipment and clothing<br>setup, inspection, ignition and shutdown sequence<br>cylinder handling<br>fire prevention<br><br>4.3 Perform heating and cutting procedures.<br>heating / cutting seized fasteners / components<br>heating / cutting damaged fasteners / components                                                                                                           |
|  | <b>Course Outcome 5</b>                                                                                      | <b>Learning Objectives for Course Outcome 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | Demonstrate a working knowledge of the use of a                                                              | 5.1 Perform the following functions on a Networked PC.<br>access trade related information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                               | personal computer.                                                                                                                                     | access internet<br>browsing<br>file download<br>access Email<br>reading attachments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |                   |      |     |              |     |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|------|-----|--------------|-----|
|                                               | <b>Course Outcome 6</b>                                                                                                                                | <b>Learning Objectives for Course Outcome 6</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |      |     |              |     |
|                                               | Demonstrate the use of proper jacking and hoisting equipment used in the motive power industry.                                                        | 6.1 Explain safe practices for hoist and lifting equipment.<br>Use of safety stands, jacks<br>Vehicle placement and movement<br>Finding the lifting points<br>Equipment maintenance<br><br>6.2 Identify lifting and hoisting equipment.<br>Lifting capacities<br>Adaptors & extensions<br>Types of hoists and lifting equipment<br>Safety locks and releases<br><br>6.3 Perform lifting of vehicles using shop lifts and hoisting equipment.<br>Position vehicle / wheel chocks<br>Check overhead environment<br>Verify correct engagement of lift points<br>Verify balance<br>Verify correct use of safety lock |                 |                   |      |     |              |     |
| <b>Evaluation Process and Grading System:</b> | <table><tr><th>Evaluation Type</th><th>Evaluation Weight</th></tr><tr><td>shop</td><td>30%</td></tr><tr><td>Theory Tests</td><td>70%</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Evaluation Type | Evaluation Weight | shop | 30% | Theory Tests | 70% |
| Evaluation Type                               | Evaluation Weight                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |      |     |              |     |
| shop                                          | 30%                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |      |     |              |     |
| Theory Tests                                  | 70%                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |      |     |              |     |
| <b>Date:</b>                                  | June 20, 2019                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |      |     |              |     |
| <b>Addendum:</b>                              | Please refer to the course outline addendum on the Learning Management System for further information.                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                   |      |     |              |     |