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Technical-Vocational Education (TVE) Overview

In 2013, Manitoba Education and Advanced Learning released the document *Technical-Vocational Education Overview* to provide the philosophical and pedagogical underpinnings for curriculum development and the teaching of courses in the Senior Years Technology Education Program. This overview provides educators with the vision and goals of technical-vocational education (TVE) in Manitoba.

Topics include the following:

- curriculum revitalization and renewal
- curriculum framework and implementation
- articulation
- assessment and reporting
- safety
- employability/essential skills and career development
- sustainable development

TVE clusters of courses are designed to encourage students to explore career options in designated trades and trained occupations, and to address labour shortages in these areas. The TVE curriculum includes course clusters for both designated trades (those designated for apprenticeship training and certification by Apprenticeship Manitoba) and trained occupations (those not designated as trades). The TVE curriculum is significantly different from other subject areas such as industrial arts. It has distinct qualities that, when respected, will provide students with a uniquely valuable experience that they cannot receive from any other curriculum. TVE gives students the opportunity to learn the theoretical and practical aspects of one trained occupation in order to facilitate their transition from school to work or to post-secondary education in that trained occupation, or into an associated occupation. This transition is accomplished by having students complete an entire TVE cluster of courses, learning from industry-certified teachers with industry experience in a setting that, as much as possible, emulates an actual workplace.

TVE curriculum includes Grades 9 to 12 courses in a variety of areas, including automotive technology.

Senior Years Technology Education (SYTEP) Diploma

To receive a SYTEP diploma, a student must complete eight departmentally developed courses from an approved technical-vocational cluster, together with 17 compulsory credits and five optional credits. The grade level in which the courses are offered are a local, school-based decision, but it is highly recommended that the sequencing of credits follow the schedule set out below. Cross-curricular learning outcomes include essential skills from subject areas including, but not limited to, English language arts, mathematics and the sciences. These essential skills are to be integrated into the authentic activities of the course. Learning outcomes dealing with the following topics are also integrated into most courses:

- health and safety
- evolution, technological progression, and emerging trends
- sustainability
- ethical and legal standards
• employability skills
• the automotive industry

In most courses, the emphasis is on applied activities. For instructional purposes, the sequence of learning outcomes can vary based on the activities within the course. Teachers are advised to select the activities best suited to teach the learning outcomes, based on a variety of factors, including access to resources or regional needs. The curriculum is not sequential. In other words, learning outcomes might be taught in an order different from how they appear in the document. In light of rapid changes in technology, teachers are encouraged to update their activities in order to meet the needs of students.

Automotive Technology as a TVE Cluster

Grades 9 to 12 Automotive Technology: Manitoba Technical-Vocational Curriculum Framework of Outcomes identifies the goals, general learning outcomes (GLOs) and specific learning outcomes (SLOs) for nine automotive technology courses. This framework is intended for use in all Manitoba schools teaching automotive technology as part of the Senior Years Technology Education Program. Like all other TVE courses, Automotive Technology courses can be taught only as part of a complete cluster by a school which Manitoba Education and Training has approved to do so.

Students who have completed the automotive technology cluster will have completed all of the Level 1 Apprenticeship technical training requirements for Automotive Service Technician (AST) from Apprenticeship Manitoba. https://www.gov.mb.ca/wd/apprenticeship/discover/mbtrades/autoservicetech.html

Students who complete the cluster will be able to:
- perform basic maintenance and service to vehicles
- perform a vehicle inspection
- complete repairs and service to vehicle systems
- complete preventative maintenance procedures
- perform repairs related to drivability concerns
- understand and use computerized systems
- communicate and work with peers, employers, and customers
- demonstrate logical thinking and decision making
- work independently or as part of a team
- demonstrate the ability for lifelong learning to enhance their skills
- demonstrate time management skills
- show mechanical aptitude and manual dexterity
- demonstrate problem-solving skills
- demonstrate employability skills
2019 Revisions to the Automotive Technology Curriculum

During the 2018/2019 school year, a committee of Automotive Technology teachers was struck to make revisions to the high school automotive technology in order to reflect the changes to the Automotive Service Technician Level 1 technical training from Apprenticeship Manitoba. The Automotive Service Technician Level 1 technical training had undergone revisions as part of the National Harmonization Initiative which aligned trades training across Canada. The 2019 version of the Automotive Technology high school curriculum reflects the changes made as a result of the harmonization initiative.

Employment Opportunities for Graduates of Automotive Technology

Students who have completed the automotive technology courses can seek entry-level employment as an apprentice automotive service technician, service consultant, parts advisor, parts rebuilder, maintenance technician, specialty/after-market technician, sales consultant, tools and equipment representative, or a military vehicle technician. In order to be qualified and continue as an automotive service technician, students must seek apprenticeship and continue post-secondary training. Automotive technology graduates are typically employed by dealerships and independent service centres, automotive specialty repair shops, parts suppliers, automotive sales and leasing companies, parts recyclers and manufacturers, large organizations with fleets of automobiles, the military, and automotive body repair companies.

The education requirements for entry to the automotive industry vary from high school graduation and/or completion of a technical vocational program at the secondary level for entry-level employment, to college, apprenticeship, and university for related employment in the automotive technology industry.

Automotive technology provides a foundation for students to go directly to work, continue into post-secondary education to become an automotive service technician or to study automotive engineering, design manufacturing, management in the automotive industry, or automotive education.
Qualifications for Automotive Technology Teachers

Only vocationally certified teachers are allowed to teach TVE courses, including the ones in this cluster. Vocational certification for Automotive Technology includes three components:

1. **Automotive Service Technician (AST) Journeyperson Certification**: Automotive Technology teachers need to have personally achieved certification as AST Journeypersons so that they can share that experience with their students. In order for students to have the option to complete their Level 1 technical training in Automotive Service Technologist, around which this cluster has been developed, the teachers must have gone through the process of becoming AST journeypersons, so that they can teach that process to students.

2. **Industry Experience**: Automotive Technology teachers need to have been employed in the automotive industry for at least six years (including the time that they spent as apprentices). This will enable them to share their industry experience with students, which will, in turn, prepare them for working in the industry.

3. **Technical-Vocational Teaching Certificate**: TVE teachers need to earn their technical vocational teaching certificate, obtained by completing Red River College’s one-year Technical-Vocational Teacher Education Diploma program. For information about this program, see: [https://catalogue.rrc.ca/Programs/WPG/FullTime/TECVF-DP](https://catalogue.rrc.ca/Programs/WPG/FullTime/TECVF-DP)

Employing only vocationally certified teachers to teach TVE courses preserves the integrity of TVE programming by ensuring that teachers are able to share their first-hand experience working in IT, as well as their familiarity with industry certification. Students receive instruction from somebody who has been involved in that industry. School boards risk significant liability if they employ non-vocationally certified teachers to teach TVE courses. Vocational certification confirms that a teacher has the requisite skills and knowledge to teach the health, safety and security concerns associated with the automotive industry. For further information, see “Professional Certification: Technical Vocational Teacher” on the Manitoba Education and Training website at [www.edu.gov.mb.ca/k12/profcert/certificates/vocational.html](http://www.edu.gov.mb.ca/k12/profcert/certificates/vocational.html)

Comparison of TVE Automotive Technology with Industrial Arts Power Mechanics Technology

Like all TVE curricula, *Grades 9 to 12 Automotive Technology: Manitoba Technical-Vocational Framework of Outcomes* has been developed to prepare high school students for a career in one specific trade. In this case, students will learn the knowledge, skills, and attitudes required to work as automotive service technicians. It has not been developed as a general interest cluster of courses in power mechanics technology. Schools interested in teaching such a course are invited to teach the Industrial Arts curricula, which can be found on the department’s website at [https://www.edu.gov.mb.ca/k12/cur/teched/ind_arts.html](https://www.edu.gov.mb.ca/k12/cur/teched/ind_arts.html)

Although automotive technology and industrial arts power mechanics technology curricula share some common content, they have been developed for completely different purposes, and have significant differences. The chart on the following page summarizes some of the differences between automotive technology (as a TVE cluster) and power mechanics technology (as an industrial arts cluster).
Automotive Technology & Industrial Arts Power Mechanics Technology Comparison Chart

<table>
<thead>
<tr>
<th>Question</th>
<th>TVE Automotive Technology</th>
<th>Ind. Arts Power Mechanics Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the purpose to facilitate students’ transition to the automotive trade?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. Does the instruction try to emulate, as far as possible, a regular workplace?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>3. Does the curriculum mandate employability skills such as punctuality and time management?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4. Is the teacher required to be a journeyperson Automotive Service Technician (AST)?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5. Is the teacher required to have experience working as an AST?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>6. Does the cluster prepare students for certification as a journeyperson AST?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>7. Does the cluster focus on preparing students for entry-level employment as an AST after high school?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>8. Is the teacher required to have a Manitoba General Teacher Certificate?</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>9. Is the teacher required to have a Manitoba Vocational Teacher Certificate?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>10. Do schools require special permission from Manitoba Education and Training to offer the cluster of courses?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>11. Do schools have to offer all of the courses in the cluster?</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>12. Does the cluster focus on only one trade or trained occupation?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>13. Can schools offer hybrid clusters, made up of courses from several clusters?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>14. Will students receive a Senior Years Technology Education Program (SYTEP) Diploma when they complete a cluster of courses?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Automotive Technology Goals and General Learning Outcomes

The learning outcomes for each course in the automotive technology cluster are based on the following curriculum goals and general learning outcomes (GLOs). Please note that some courses do not address all of these goals and GLOs.

Goal 1. Describe and apply appropriate health and safety practices.
   GLO 1.1: Describe and apply appropriate health and safety practices.
   GLO 1.2: Demonstrate awareness of safety as it pertains to the Trade Safety Awareness Manual

Goal 2. Select, use and maintain tools, equipment, materials, and consumables.
   GLO 2.1: Select, use and manage tools and equipment.
   GLO 2.2: Select, use and manage materials and consumables.

Goal 3. Describe, inspect, diagnose, service and repair automotive components and systems.
   GLO 3.1: Describe automotive components and systems.
   GLO 3.2: Inspect and diagnose automotive components and systems.
   GLO 3.3: Service and repair automotive components and systems.

Goal 4. Describe and apply transferable cross-curricular knowledge and skills.
   GLO 4.1: Describe and apply knowledge and skills from information and communication technologies.
   GLO 4.2: Describe and apply knowledge and skills from the sciences.
   GLO 4.3: Read, interpret, and communicate information.
   GLO 4.4: Describe and apply knowledge and skills from mathematics.

Goal 5. Demonstrate understanding of sustainability.
   GLO 5.1: Demonstrate understanding of sustainability.

Goal 6. Demonstrate awareness of ethical and legal standards.
   GLO 6.1: Demonstrate awareness of ethical and legal standards.

Goal 7. Demonstrate employability skills.
   GLO 7.1: Demonstrate employability skills.
   GLO 7.2: Demonstrate an understanding of the business operation of a repair/service facility.

Goal 8. Demonstrate understanding of educational and career opportunities.
   GLO 8.1: Demonstrate understanding of educational and career opportunities.

   GLO 9.1: Demonstrate awareness of the evolution, technological progression, and emerging trends in the automotive industry.
Specific Learning Outcomes (SLOs)

Grades 9 to 12 Automotive Technology: Manitoba Technical-Vocational Curriculum Framework of Outcomes identifies specific learning outcomes (SLOs) for use in all Manitoba schools teaching the Grades 9 to 12 Automotive Technology courses as part of the Senior Years Technology Education Program. SLO statements define what students are expected to achieve by the end of a course.

It is essential for students to learn and to demonstrate safety practices and employability skills; therefore, some SLOs related to safety and to employability skills are repeated in all courses.

Please note that SLOs are not identified for the goals and GLOs that are not addressed in a given course.

In order to emphasize and simplify the correlation between this document and the AST technical training from Apprenticeship Manitoba, this document has, as much as is practical, kept all of the objectives from each unit together under one GLO, even when some of the objectives might be more logically placed under a different GLO.

For example, all of the objectives under Apprenticeship Manitoba’s Unit A3 Tools, Equipment, Materials and Documentation have been placed under GLO 2.1 in course 8696 Automotive Systems and Service. Logically, Objective A3.1 (Identify hazards and describe safe work practices pertaining to the use of tools and equipment) could be placed under GLO 1.1, which focuses on health and safety practices. However, the review committee concluded that it would be most useful to have all of the objectives in Unit A3 together, in order, under the same GLO. Note that the AST technical training documents are found here: https://www.gov.mb.ca/wd/apprenticeship/discover/mbtrades/autoservicetech.html
Course Descriptions

**8695 Introduction to Automotive Technology**  
15S 15E 15M  
10S 10E 10M

This is an optional course intended for students wishing to sample automotive technology. It may be delivered as a half-credit or full-credit course. The emphasis is on hands-on activities. Students are introduced to safety, tools and equipment, automotive systems, and service procedures.

**8696 Automotive Systems and Service**  
20S 20E 20M

A student wanting to develop skills in the automotive service and repair industry must have knowledge of the basic principles related to automotive systems and service. Students learn safety, tools, and equipment, automotive systems, and service procedures, and are introduced to diagnostic strategies, and learn about tires, wheels and hubs. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A1 Learning About Work
- Unit A3 Tools, Equipment, Materials and Documentation
- Unit A11 Tires, Wheels and Hubs

**8697 Engine Fundamentals and Service**  
30S 30E 30M

A student wanting to develop skills in the automotive service and repair industry must have knowledge of the basic principles of the internal combustion engine, the inner workings and relations of the engine components, and how those relate to vehicle operation. The student will learn the procedures to service, repair, and replace engines and their components. They will also learn about the mathematics required for the automotive trade. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A5 Trade Related Mathematics
- Unit A6 Engine Fundamentals

It also focuses on the Trade Safety Awareness Manual

**8698 Chassis Fundamentals and Service**  
30S 30E 30M

A student wanting to develop skills in the automotive industry must have knowledge of the basic principles of the vehicle chassis and its brake system. The student will be able to describe, diagnose, and repair braking, steering, and suspension systems. The student will develop an understanding of the principles of wheel and steering alignment and be able to apply the principles to diagnose and align steering systems. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A8 Steering and Suspension Systems I
- Unit A10 Braking Systems I (Non-ABS)
8699 Drivetrain Fundamentals and Service 30S 30E 30M
A student wanting to develop skills in the automotive industry must have knowledge of the basic principles of the vehicle drivetrain. The student will develop an understanding of the different drivetrain configurations and their components. The student will be able to diagnose and repair a variety of drivetrain components. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A9 Drive shafts and Axles

8700 Automotive Electrical Systems 40S 40E 40M
A student wanting to develop skills in the automotive industry must have knowledge of the basic principles of automotive electrical systems. The student will understand the principles of electricity and electronics as they relate to automotive systems. The student will be able to diagnose, service, and repair automotive electrical circuits and components. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A7 Electrical Systems I: Fundamentals

8701 Vehicle Systems Part 1 40S 40E 40M
A student wanting to develop skills in the automotive industry must have knowledge of the operation of the automotive electronic and control systems. Students’ knowledge in electrical systems will be further enhanced by learning about the principles of ignition, control, and communications systems. The student will be able to diagnose, service, and repair ignition, control, and communications systems. This course does not focus on any of the units in the Apprenticeship Manitoba Level 1 technical training.

8702 Vehicle Systems Part 2 40S 40E 40M
A student wanting to develop skills in the automotive industry must have knowledge of engine management and emission systems. The student will understand the principles of fuel supply, metering, and vehicle emissions. The student will be able to use electronic diagnostic interface to diagnose, service, and repair engine management and emission systems. They will also learn about hybrid and electrical vehicles. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A13 Hybrid and Electrical Vehicle Systems I

8703 Applied Diagnostic Strategies 40S 40E 40M
A student wanting to expand skills in the automotive industry must be able to apply diagnostic strategies to a variety of vehicle systems and components. The students will demonstrate the ability to diagnose and correct customer concerns and to complete vehicle repairs to accepted industry standards. They will also learn about body components and trim. This course focuses on the following unit in the Apprenticeship Manitoba Level 1 technical training:

- Unit A12 Body Components and Trim
Level 1 Apprenticeship

In order to teach the courses listed above, teachers must refer to the automotive service technician technical training documents from Apprenticeship Manitoba, which can be found at [www.gov.mb.ca/wdis/apprenticeship/discover/mbtrades/autoservicetech.html](http://www.gov.mb.ca/wdis/apprenticeship/discover/mbtrades/autoservicetech.html)

The specific learning outcomes in the eight mandatory high school courses include all of the Manitoba apprenticeship training for automotive service technician objectives. Some of the specific learning outcomes in this framework of outcomes include an alphanumeric reference in brackets such as (A2.1) at the end. This refers to Unit A2, Automotive Service Technician Objective 2 from Apprenticeship Manitoba. The apprenticeship level (1 to 4) is listed after the alphanumeric reference in brackets (i.e., Level 1).

The Apprenticeship documents provide necessary, detailed information and clarification of the high school framework outcomes. Teachers must teach all of the objectives and content found in the Apprenticeship documents that are referenced in the framework of outcomes. This will ensure that students will have learned all of the objectives for Level 1 certification from Apprenticeship Manitoba.

Automotive technology courses delivering the entire curriculum (which might not include the optional Grade 9 course) may be eligible for accreditation with Apprenticeship Manitoba. For more information on accreditation, go to [www.gov.mb.ca/tce/apprent/forms/pdf/accreditation_guidelines.pdf](http://www.gov.mb.ca/tce/apprent/forms/pdf/accreditation_guidelines.pdf)

Red Seal Resources

Because AST is a designated Red Seal trade across Canada, the Apprenticeship Manitoba curriculum is aligned with the Canada-wide Red Seal curriculum. High school Automotive Technology teachers, as well as students working towards their Level 1 apprenticeship for welder, can find valuable resources in the [Welder](http://www.red-seal.ca/trades/w.2ld.2r-eng.html) section of the Red Seal Program website.

Among other resources, teachers and students can find sample examination questions used on Red Seal examinations.

Trade Safety Awareness Manual

Apprenticeship Manitoba has developed a Trade Safety Awareness Unit that is intended to increase student awareness of trade safety in the workplace. All students, including those in high school, who are studying a designated trade must complete this seven-hour unit. The learning outcomes from the Trade Safety Awareness Unit have been incorporated into Goal 1 of this curriculum. For more information and to access the Trade Safety Awareness Unit and its tests and other resources, go to [www.gov.mb.ca/tce/apprent/apprentice/trade_safety](http://www.gov.mb.ca/tce/apprent/apprentice/trade_safety)

The Trade Safety Awareness Unit’s alphanumeric designations are located at the end of the framework of outcomes. For example, the following SLO is found in Automotive Systems & Service:

- Explain the S.A.F.E. acronym. (TSA 6)

The (TSA 6) indicates that this learning outcome is taken from the Trade Safety Awareness Unit from Apprenticeship Manitoba.