

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Drive Train Systems

CODE NO. : AST704 **LEVEL:** 2

PROGRAM: Automotive Service Technician Apprenticeship (6068)

AUTHOR: Stephen Kent

DATE: June 08 **PREVIOUS OUTLINE DATED:** N/A

APPROVED:

	“Corey Meunier”	
	CHAIR	DATE

TOTAL CREDITS:

PREREQUISITE(S):

HOURS/WEEK:

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For additional information, please contact Corey Meunier, Chair
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(705) 759-2554, Ext. 2610

I. COURSE DESCRIPTION:

In this course the student will be introduced to manual transaxles, differentials and front wheel drive axle assemblies. They will also perform disassembly and reassemble of manual transaxles and differentials. Inspection of gear tooth contact patterns and tracing power flows will also be performed. Automatic transmissions will be introduced focusing on pump types, valves, torque converters and planetary gear sets both simple and compound. Student will also be introduced to specialized tools and equipment utilized in the repair of transmissions.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. *Describe the functions, construction, types, styles and application of front wheel drive axle assemblies.*

Potential Elements of the Performance:

Describe the following:

- front wheel drive axles
- half shafts
- constant velocity
- bearings
- constant velocity (CV) boots
- vibration damper
- front wheel drive axles
- torque steer
- inner and outer constant velocity joints
- vibration damper operation
- front wheel drive axles
- half shafts
- constant velocity
- bearings
- constant velocity (CV) boots
- vibration damper
- front wheel drive axles

- torque steer
- inner and outer constant velocity joints
- vibration damper operation

2. Describe the construction and operation of manual transaxles.

Potential Elements of the Performance:

- Compare and contrast front wheel drive vs. rear wheel drive.
- Trace power flows through a transaxle.
- Explain operation of the synchronizer hub assembly.
- Outline shift mechanisms.
- Disassemble and inspect a transaxle and perform assigned operations to determine gear ratio and final drive ratio.

3. Explain front wheel drive axle construction and operation.

Potential Elements of the Performance:

- State the difference between a plunge and a fixed CV joint.
- Remove and install axle assemblies from vehicles.
- Perform assigned operations to remove CV boots and joints from the half shafts.
- Explain the diagnostic sequence used to determine CV joint failure.

4. Outline differential operation.

Potential Elements of the Performance:

- Determine gear ratio.
- Trace power flow through differential.
- Define preload and backlash.
- Explain a tooth contact pattern.

5. Explain the construction and operating principles of automatic transmissions.

Potential Elements of the Performance:

- Describe clutch pack and band operation.
- List three types of pumps.
- Outline control devices.
- Describe a compound planetary gear set.
- Explain torque converter operation.

6. Describe special tools required for servicing and repairing automatic transmission equipped vehicles.

Potential Elements of the Performance:

- Identify tools used for transmission repair.
- Explain how clutch packs are disassembled.

7. Describe the construction, types, styles and application of transfer case assemblies.

Potential Elements of the Performance:

- Outline shifting
- Describe ranges
- Explain differential ability

8. Perform inspection, testing, and diagnostic procedures on transfer case assemblies following manufacturers' recommendations

Potential Elements of the Performance

- Describe the removal and installation procedures
- Identify operating ranges
- Measurements and adjustments
- Identify component failures and causes

III. TOPICS:

1. Describe the functions, construction, types, styles and application of front wheel drive axle assemblies.
2. Describe the construction and operation of manual transaxles.
3. Explain front wheel drive axle construction and operation.
4. Outline differential operation.
5. Explain the construction and operating principles of automatic transmissions.
6. Describe special tools required for servicing and repairing automatic transmission equipped vehicles.
7. Describe the construction, types, styles and application of transfer case assemblies.
8. Perform inspection, testing, and diagnostic procedures on transfer case assemblies following manufacturers' recommendations.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Automotive Technology First Canadian Edition

Pens, pencils, calculator, 3-ring binder

*shop coat or coveralls

*CSA approved steel toe boots (high top)

*CSA approved safety glasses

*these items mandatory for shop

V. EVALUATION PROCESS/GRADING SYSTEM:

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

- Classroom – 60% of the final grade is comprised of term tests.
- Assignments – 10% of the final grade is comprised of a number of technical reports.
- 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)

The following semester grades will be assigned to students:

Grade	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

VI. SPECIAL NOTES:Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Code of Conduct*. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. ADVANCE CREDIT TRANSFER:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question.