

I. COURSE DESCRIPTION:

In this course the student will participate in an in-depth study of the internal combustion engine cylinder head and valve train assemblies. Camshaft drive mechanisms will be studied and the students will properly set camshaft to crankshaft timing following manufacturers recommendations. They will also dismantle cylinder heads and valve train systems with proper tools and service information. In addition to this they will perform valve adjustment and observe machining operations on valves, valve seats and valve guides.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Describe the purpose and fundamental operation of the camshaft and valve train assemblies

Potential Elements of the Performance:

- Explain relationship of valves to piston position .
- Compare and contrast overhead cam to in block camshaft engines.
- Describe operation of rocker arms and cam followers.
- State the difference between hydraulic and solid lifters.

2. Describe the construction, composition, types, styles and application of valve trains drives and camshaft assemblies.

Potential Elements of the Performance:

- Identify four types of camshaft drive mechanisms.
- Describe the camshaft selection process.
- Disassemble and inspect engine valve train and drive assemblies.

3. Explain the significance of the camshaft in relation to engine performance

Potential Elements of the Performance:

- Create a valve timing event diagram.
- Describe valve lead, lag and overlap.
- Define volumetric efficiency.
- Explain the effects of valve lift and duration.

4. Explain the principles of operation of valve train and camshaft service equipment.

Potential Elements of the Performance:

- Observe training videos on equipment and its proper use.
 - Participate in hands on demonstration of valve face and seat grinding.
5. Perform inspection and testing procedures on camshafts and valve trains drive mechanisms following manufacturers' recommendations.

Potential Elements of the Performance:

- Perform valve adjustment to manufacturers specifications.
- Measure camshaft lift.
- Adjust camshaft timing to manufacturers specifications.
- Measure valve spring tension and installed height.

III. TOPICS:

1. Describe the purpose and fundamental operation of the camshaft and valve train assemblies
2. Describe the construction, composition, types, styles and application of valve trains drives and camshaft assemblies.
3. Explain the significance of the camshaft in relation to engine performance
4. Explain the principles of operation of valve train and camshaft service equipment.
5. Perform inspection and testing procedures on camshafts and valve trains drive mechanisms following manufacturers' recommendations.

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Modern Automotive Technology – Text & Workbook

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

(Student 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%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
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 703 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.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. 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.

<include any other special notes appropriate to your course>

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.

