COURSE DESCRIPTION:

Prerequisites: TRN 120
Corequisites: None

This course covers engine machining processes for remanufacturing automotive engines. Emphasis is placed on cylinder head service, machining block surfaces, reconditioning connecting rod assemblies, camshafts, flywheels, and precision measurement. Upon completion, students should be able to explain the operation and proper use of automotive machining equipment. Course Hours per Week: Class Hours, 2; Lab Hours, 6. Semester Hours Credits, 4.

SAFETY DISCLAIMER:

Automotive work presents many hazards. A moment’s carelessness can cause injury to oneself or to others. Such mishaps can occur quickly due, in part, to the nature of the industrial tools used in automotive work. The weight of automobiles and the equipment used to fix them can even cause fatal injuries. Therefore, great care must always be taken in checking out equipment before use, and in using that equipment to work on automobiles.

As we work to insure the safety of everyone in the Durham Tech automotive lab, it is the instructor’s responsibility to introduce students to equipment and to advise them on its safe operation. Those health and safety procedures are also presented in each textbook for each course in the automotive program. Students are responsible for mastery of that safety information. Durham Tech holds each student in every class responsible for reading and applying all of the information regarding personal and public safety and personal and public health in the required text.

While working in the Durham Tech automotive lab, safety glasses must be worn by everyone. However, safety glasses are only one small requirement so that students remain injury free. All safety recommendations in the text book and from the instructor must be followed. A student with any questions about a safety procedure should immediately ask an instructor for clarification.

Any student using equipment in the automotive lab must be responsible for using that equipment in a safe manner. Durham Tech holds each student in automotive classes responsible for acting to ensure a safe environment and to ensure both the student’s own safety and the safety of his classmates.
LEARNING OUTCOMES:

Upon completion of this course the student will be able to:

a. Describe the engine machining processes.
b. Diagnose and repair defects in engine components.
c. Operate basic engine machining equipment and tools.
d. Use the engine lathe, bench lathe and drill press competently.

OUTLINE OF INSTRUCTION:

I. Review the Basic Machine Tools
   A. Uses and application
      1) Changing specifications
      2) Returning to same specifications
   B. Basic machine tools
      1) Boring bar
      2) Valve-grinding machine
      3) Precision honing machine
      4) Hydraulic press
      5) Automatic Cylinder honing machine
      6) Flywheel Machine
   C. Operation of cylinder head/block resurfacer
      1) Set-up for various head types
      2) Resurfacing heads & block

II. Application of Basic Machining Tools
   A. Use of the boring bar
      1) Preparing the machine
      2) Preparing the block
   B. Valve, seat and guide equipment
      1) Setting up the valve refacer
      2) Preparations for use of the valve-seat grinder
      3) Care of the equipment
         a. Operation of valve/seat service equipment
         b. 3 angle cutting and bowl hogging
         c. Valve guide repair and servicing
         d. Valve seat insert installation
   C. Precision honing machines
      1) Piston-pin fitting
      2) Honing hydraulic cylinders
      3) Honing the big ends of connecting rods
D. Hydraulic press operations
   1) Use of press for removing and replacing piston pins with interference fit.
   2) Proper support for heavy press operations
   3) Safety factors in pressing where parts might break or slip out of press
   4) Maintenance procedures

E. Block and cylinder head re-surfacing
   1) Determining the need for surfacing
   2) Block mounting and surfacing
   3) Head mounting and surfacing
   4) Correction and effect of surfacing on manifold alignment and cam timing

F. Piston pin press and heater
   1) Pressing piston of rods
   2) Mounting piston back on connecting rods

G. Cylinder Honing
   1) Setting dial bore gauge
   2) Setting block in machine/machine operation
   3) Setting of stops
   4) Preventing taper

H. Crack detection/repair
   1) Magnetic crack detection
   2) Penetrate detection
   3) Penning of crack
   4) Crack plugging
   5) Welding options

I. Flywheel Grinding
   1) Determining grinding need
   2) Flywheel setup
   3) Machine operation

III. Introduction to the Engine Lathe
A. Nomenclature and servicing
B. Types of operations
   1) Straight turning
   2) Taper turning
   3) Knurling
   4) Thread cutting
   5) Drilling and boring
C. Application of types of operations
   1) How to set up for straight turning
      a. Preparation of tool bit
      b. Drilling and facing end for live center
      c. Use of micrometer collar for control of cut
      d. Setting RPM of spindle for correct cutting speed
IV. Vertical milling
   A. Spindle Speeds
   B. Milling operations
      1) Hole repair
      2) Basic milling

V. New Automotive Machining Technologies

**REQUIRED TEXTBOOKS AND MATERIALS:**

To be announced by the instructor.

**NATEF:** Not a NATEF Requirement.