Tech Craftsman Career Building Trade School, TCCBTS

Automotive Machine Shop Technology Curriculum

This Curriculum is designed for:
Auto Machine Shop Industrial Education Technology
2016

This program is designed for
Interim Director, Proprietary School Certification
Missouri Department of Higher Education
PO Box 1469
Jefferson City, MO 651021469

This Program is designed to give individuals a real career extensive training program
The Program runs non-stop 24 Month, 8 hour days, 5 days weeks

The Curriculum is designed to receive permission to operate as a Proprietary School, in the State of Missouri. TCCBTS being a Proprietary School allowing TCCBTS to become both a trade school and 4-year-university; the curriculum will be revised by TCCBTS Advisory Committee and instructors when needed.

Tech Craftsman Career Building Trade School is offering two different machine programs with two completely different Curriculums: This curriculum is designed tor Automotive Machine Shop Technology; once the interns/apprentices graduate they will be capable to:

This program is designed for Automotive Machine Shop Machine shops disassemble pistons, clean them and put them back together to enhance engine performance. The shops take apart transmissions and clean the gears. Machine shops grind and bore holes to exact measurements that match other parts that fit into the holes. They match and time valves properly to ensure fluid and air flow properly in an automobile. They also dismantle engine blocks and alter them for better performance with regards to pistons, spark plugs and fuel injection.

Cleaning tanks let automotive parts soak and clean in various chemical baths. Boring machines are huge set-ups with heavy equipment that grind out holes for pistons in an engine block to precise widths. Balancing tables allow machinists to add or subtract precise weights that ensure parts are balanced perfectly so the engine runs smoothly. Ovens heat up small parts and pins so they can fit inside other engine parts. When these metal parts cool, they are locked in place due to expansion.

I. Concepts and Content

Tech Craftsman Career Building Trade School's will offer is to make sure the purpose stays the same with this program; prepare TCCBTS Interns/Apprentices for employment as automotive machinists, or better yet TCCBTS's terminology, preparing the interns/apprentices for employment as "Master Automotive Machine Shop Technicians. "

Tech Craftsman Career Building Trade School:

Instructors will instruct interns/apprentices to set up and operates variety of general or specialized metalworking machines to repair automotive engine parts or auxiliary units, such as transmission, differential, springs, or brakes, applying knowledge of mechanics, shop mathematics, metal properties, and machine procedures: Operates lathe to machine water-pump castings, piston heads, valves, and other automotive parts. To clamp piston in carriage of piston-grinding-and-turning machine to grind piston heads to fit cylinders. To adjust grinding wheel to make cut of specified depth. Other duties is to clamp valves in position on grinding wheel to grind seating surfaces of valves, moving levers to achieve required depth of cut.

Interns/Apprentices will operate boring machine to machine internal surfaces of cylinders in engine block, cleans parts, before and after machining, in agitator-type cleaning tank to remove grease, rust stains, and foreign matters. Each intern/apprentice will operates lathe, boring, or honing machine to refinish internal surfaces of bearings and connecting rods. Interns/Apprentices will verify dimensions, using measuring instruments, such as micrometers, calipers, and height gauges to ensure adherence to tolerance specifications.

Interns/Apprentices may grind metal surfaces of engine block or other parts, using portable or bench grinders. Interns/Apprentices may spray worn or gouges parts with molten aluminum, zinc, or other metal to build up parts [METAL SPRAYER, MACHINED PARTS (any industry)]. Interns/Apprentices may examine parts for fractures, using magnaflux (Magnetic particle Inspection (MPI) is a non-destructive testing (NDT) process for detecting surface and slightly subsurface discontinuities in ferromagnetic materials such as iron, nickel, cobalt, and some of their alloys.

The process puts a magnetic field into the part) test equipment. Interns/Apprentices may repair cracks in engine head and other vehicle parts with arc or gas welding equipment. May operate drum lathe to resurface brake drums. May repair and resurface leaf and coil springs, axles, kingpins, bushings, and universal joints.

The content TCCBTS includes, but is not limited to, communication skills, leadership skills, human relations and employability skills as masters in their trade, safe and efficient work practices, remanufacture of automotive engines to original factory specifications, make judgments on when to remachine or replace components, remachine components for engine rebuild, recognize metal fatigue, and manufacture unusual or special parts when necessary.

TCCBTS programs focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Automotive industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

II. TCCBTS Auto Shop Activities These activities:

An integral part of the program and provide instruction in cleaning, inspecting, grinding, drilling, honing, and reassembling automotive parts with an emphasis on accuracy.

III. SPECIAL NOTE:

Tech Craftsman Career Building Trade School will work to partner up with SkillsUSA Inc. Defining (SkillsUSA) is a United States career and technical interns/apprentices organization serving more than 320,000 high school and college interns/apprentices and professional members enrolled in training programs in technical, skilled, and service occupations, including health occupations) is the appropriate Career and Technical Interns/Apprentices Organization (CTSO) for providing leadership training and for reinforcing specific career and technical skills. Career and Technical Interns/Apprentices Organizations, when provided, shall be an integral part of the career and technical instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with any Missouri rules if applicable.

Cooperative training, defined as (Co-operative Education (Co-op) is a type of internship program that enables college interns/apprentices to receive career training with pay as they work with professionals in their major fields of study. Work experience in government, business, industry, and human services enhances the intern/apprentice training.) – On Job Training and Hands-On-Instruction is appropriate for this program.

IV. INTENDED OUTCOMES: After successfully completing the program interns/apprentices will be able to:

Occupational Completion Point:

A - Disassembly and Cleaning Technician

- A-1 Interns/Apprentices will explain the principles of power.
- A-2 Interns/Apprentices will identify and use precision and non-precision hand tools.
- A-3 Interns/Apprentices will explain proper cleaning methods.
- A-4 Interns/Apprentices will disassemble and inspect engines.
- A-5 Interns/Apprentices will clean automotive engine components.
- A-6 Interns/Apprentices will demonstrate appropriate math skills.
- A-7 Interns/Apprentices will demonstrate employability skills.

Occupational Completion Point:

B - Head and Block Reconditioning Technician

- B-1 Interns/Apprentices will surface grind heads.
- B-2 Interns/Apprentices will machine connecting rods and main bearing caps for finish honing.
- B-4 Interns/Apprentices will service pistons.
- B-5 Interns/Apprentices will perform magnaflux nondestructive testing.
- B-6 Interns/Apprentices will demonstrate appropriate communication skills.
- B-7 Interns/Apprentices will demonstrate appropriate understanding of basic science.

Occupational Completions Point:

C - Crank Shaft Grinding and Rod Reconditioning Technician

- C-1 Interns/Apprentices will machine finish complete head.
- C-2 Interns/Apprentices will service brake drums, disc brake system, and shoes.
- C-3 Interns/Apprentices will service crankshaft.
- C-4 Interns/Apprentices will service flywheels and clutches.

Occupational Completion Point:

D - Automotive Machinist

- D-1 Interns/Apprentices will operate engine lathe.
- D-2 Interns/Apprentices will operate milling machine.
- D-3 Interns/Apprentices will operate drill press.
- D-4 Interns/Apprentices will demonstrate an understanding of entrepreneurship.

E - Explain the Principles of Power:

- E-1 Interns/Apprentices will demonstrate understanding of internal combustion engines.
- E-2 Interns/Apprentices will demonstrate understanding of concepts of heat, pressure, and compression as they relate to the internal combustion engine.
- E-3 Interns/Apprentices will explain differences between two and four cycle engines.
- E-4 Interns/Apprentices will demonstrate understanding of shop safety procedures.

F - Identify and Use Precision and Non-Precision Hand Tools

- F-1 Interns/Apprentices will select and use personal safety equipment.
- F-2 Interns/Apprentices will select, use and maintain taps, dies, hones, drills and reamers.
- F-3 Interns/Apprentices will select, use and maintain punches, saws, chisel and files
- F-4 Interns/Apprentices will select and use micrometers, calipers, dial indicators, depth gauges, boring gauges and plastigage (PLASTIGAUGE is comprised of a rod or thread of a compliant plastic material of accurately determined cross-section - either circular or square.)

G - Explain Proper Cleaning Methods

- G-1 Interns/Apprentices will identify types of soils.
- G-2 Interns/Apprentices will demonstrate understanding of chemicals and processes used for cleaning, including emulsion, parts washers, and cold and hot tanks.
- G-3 Interns/Apprentices will explain glass bead cleaning.
- G-4 Interns/Apprentices will disassemble and inspect engines
- G-5 Interns/Apprentices will remove and disassemble cylinder heads.
- G-6 Interns/Apprentices will remove and disassemble crankshafts, camshafts, rods and pistons.
- G-7 Interns/Apprentices will inspect all parts and compare to acceptable tolerances.

H - Clean Automotive Engine Components

- H-1 Interns/Apprentices will perform hot tank block cleaning.
- H-2 Interns/Apprentices will perform hot tank head cleaning.
- H-3 Interns/Apprentices will perform hot tank crankshaft cleaning.
- H-4 Interns/Apprentices will perform hot tank camshaft cleaning.
- H-5 Interns/Apprentices will bead clean valves and head.

- H-6 Interns/Apprentices will explain and demonstrate appropriate safety behavior while performing hot tank cleaning.

I - Surface Grind Heads

- I-1 Interns/Apprentices will set up and operate grinder.
- I-2 Interns/Apprentices will dress grinder wheel.
- I-3 Interns/Apprentices will inspect and replace grinder wheel.
- I-4 Interns/Apprentices will inspect finished heads.

J - Machine Finish Completed Head

- J-1 Interns/Apprentices will set up I.D.L. Precision Machining Center to replace valve guides and seats.
- J-2 Interns/Apprentices will machine guides to proper size.
- J-3 Interns/Apprentices will machine valve seats.
- J-4 Interns/Apprentices will replace valve seats.

K - Machine Connecting Rods and Main Bearing Caps for Finish Honing

- K-1 Interns/Apprentices will mark all rods and caps.
- K-2 Interns/Apprentices will check for bends and cracks.
- K-3 Interns/Apprentices will straighten rods.
- K-4 Interns/Apprentices will grind caps with rod and cap grinder.
- K-5 Interns/Apprentices will hone all rods.
- K-6 Interns/Apprentices will hone main bearing surfaces.

L - Remachine Cylinder Walls

- L-1 Interns/Apprentices will inspect cylinder blocks for damage.
- L-2 Interns/Apprentices will repair damaged areas.
- L-3 Interns/Apprentices will measure all cylinder bores.
- L-4 Interns/Apprentices will machine cylinder bores.
- L-5 Interns/Apprentices will hone cylinder walls.
- L-6 Interns/Apprentices will resleeve cylinder walls.

M - SERVICE PISTONS

- M-1 Interns/Apprentices will clean and inspect pistons.
- M-2 Interns/Apprentices will resize ring grooves.
- M-3 Interns/Apprentices will expand pistons (peening and knurling).
- M-4 Interns/Apprentices will fit piston pins.

N - Service Brake Drums, Dis Brake System and Shoes

- N-1 Interns/Apprentices will clean and inspect and measure components to be machined.
- N-2 Interns/Apprentices will set up and operate brake machining center.

O - Perform Magnaflux – Non-Destructive Testing

- O-1 Interns/Apprentices will demonstrate understanding of magnaflux testing theory.
- O-2 Interns/Apprentices will perform testing by magnetizing with contacts.
- O-3 Interns/Apprentices will perform testing by magnetizing with coil.
- O-4 Interns/Apprentices will perform testing by magnetizing with a yoke.
- O-5 Interns/Apprentices will perform dye penetrate test.
- O-6 Interns/Apprentices will maintain testing equipment.

P - Service Crankshafts

- P-1 Interns/Apprentices will check shaft in place.
- P-2 Interns/Apprentices will check shaft out of engine.
- P-3 Interns/Apprentices will straighten crankshaft.
- P-4 Interns/Apprentices will grind crankshaft.

Q - Service Flywheels and Clutches

- Q-1 Interns/Apprentices will inspect flywheels and clutch plates for wear and fatigue.
- Q-2 Interns/Apprentices will measure and grind flywheels and clutch plates.

R - Operate Engine Lathe

- R-1 Interns/Apprentices will perform turning operations.
- R-2 Interns/Apprentices will perform facing operations.
- R-3 Interns/Apprentices will perform boring operations.
- R-4 Interns/Apprentices will perform drilling operations.

S - Operate Milling Machine

- S-1 Interns/Apprentices will perform face milling operations
- S-2 Interns/Apprentices will perform climb operations.
- S-3 Interns/Apprentices will perform conventional operations.
- S-4 Interns/Apprentices will perform end operations.

T - Operate Drill Press

- T-1 Interns/Apprentices will sharpen drills.
- T-2 Interns/Apprentices will perform drilling operations in press.

U - Demonstrate Appropriate Communication Skills

- U-1 Interns/Apprentices will write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
- U-2 Interns/Apprentices will read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- U-3 Interns/Apprentices will read and follow written and oral instructions.
- U-4 Interns/Apprentices will answer and ask questions coherently and concisely.
- U-5 Interns/Apprentices will read critically by recognizing assumptions and implications and by evaluating ideas.
- U-6 Interns/Apprentices will demonstrate appropriate telephone/communication skills.

V - Demonstrate Appropriate Math Skills

- V-1 Interns/Apprentices will solve problems for volume, weight, area, circumferences and perimeter measurements for rectangles, squares and cylinders.
- V-2 Interns/Apprentices will measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
- V-3 Interns/Apprentices will add, subtract, multiply and divide using fractions, decimals and whole numbers.
- V-4 Interns/Apprentices will determine the correct purchase price, including sales tax for a materials list containing a minimum of six items.
- V-5 Interns/Apprentices will demonstrate an understanding of federal, state and local taxes and their computation.

W - Demonstrate Appropriate Understanding of Basic Science

- W-1 Interns/Apprentices will understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- W-2 Interns/Apprentices will draw conclusions or make inferences from data.
- w-3 Interns/Apprentices will identify health-related problems, which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
- W-4 Interns/Apprentices will understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

X - Demonstrate Employability Skills

- X-1 Interns/Apprentices will conduct a job search.
- X-2 Interns/Apprentices will secure information about a job.
- X-3 Interns/Apprentices will identify documents, which may be required when applying for a job interview.
- X-4 Interns/Apprentices will complete a job application form correctly.

- X-5 Interns/Apprentices will demonstrate competence in job interview techniques.
- X-6 Interns/Apprentices will identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
- X-7 Interns/Apprentices will identify acceptable work habits.
- X-8 Interns/Apprentices will demonstrate knowledge of how to make appropriate job changes.
- X-9 Interns/Apprentices will demonstrate acceptable employee health habits.
- X-10 Interns/Apprentices will demonstrate knowledge of the "Missouri Right-To-Know Law" as recorded.

Y - Demonstrate an Understanding of Entrepreneurship

- Y-1 Interns/Apprentices will define entrepreneurship.
- Y-2 Interns/Apprentices will describe the importance of entrepreneurship to the American economy.
- Y-3 Interns/Apprentices will list the advantages and disadvantages of business ownership.
- Y-4 Interns/Apprentices will identify the risks involved in ownership of a business.
- Y-5 Interns/Apprentices will identify the necessary personal characteristics of a successful entrepreneur.
- Y-6 Interns/Apprentices will identify the business skills needed to operate a small business efficiently and effectively.

More Definitions on Tech Craftsman Career Building Trade School Programs:
Automotive Technology Course Descriptions

Course work in Tech Craftsman Career Building Trade School's Automotive Programs; these programs are designed to keep interns/apprentices challenged. This keeps ideas and experience flowing in the classroom and in the motor pool/lab. Courses are taught with different interns/apprentices in mind, hands on learning, interns/apprentices in a two man groups will communication as well as informational instruction are some of the tactics all interns/apprentices will experience in this specialized program.

Interns/Apprentices will start out on basic Automotive Engines Training:

This course covers engine construction, working principles, and methods of servicing a gasoline and diesel internal combustion engines. Interns/Apprentices instruction stresses proper use of tools, torque wrenches, micrometers and equipment. Instruction discusses theory and operation of the makeup of simple and complex machines involving levers, cams, inertia and momentum.

Automotive Machine Shop This course covers the methods, technical aspects, theory, checks, and procedures used to recondition internal combustion engines and related components. Introduces to interns/apprentices any and all precision measuring tools, torque wrenches, fasteners, and machining equipment used daily by automotive machinists. Instruction discusses procedures, precision measuring devices, and special tools, as well as theories of leverage, pressure/volume, expansion, momentum, inertia, and work related to engines. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Auto Brake Systems:

This course covers the theory and principles of automotive brake systems. This course includes service diagnosis and repair of disc and drum brakes, manual and power brakes, brake system controls, indicating devices, safety, and A.B.S. and traction control system diagnosis. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Auto-Steer/Suspension

This course presents the principles of automotive wheel, steering, and suspension systems. Includes front and rear suspension alignment, theory of suspension operation, and wheel service and balance. Applies accepted repair procedures on automotive suspension. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Automotive-Chassis-Systems:

This course presents the theory, operation, and service of automotive chassis systems, including steering, suspension, and brakes. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Manual Drive Train and Axles 1:

This course introduces the theory and service of automotive power trains including: clutches and clutch linkage, drive shafts and universal joints, front-wheel drive axles, manual transmissions, manual transaxles, rear axles and differentials, including open and limited slip. This course also examines friction, gear reduction, and torque multiplication through use of gear sets, inertia, and momentum, as they apply to power train components. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Auto Electrical Systems 1:

This course introduces automotive electricity and electronics systems. This course also includes an overview of automotive circuits. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Auto-Electrical-Systems-2:

This course continues DC electrical systems for the repair and service of automotive vehicles. This course will include focuses on body electrical systems and troubleshooting of individual systems. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Intro to Work Based On-The-Job-Learning-Automotive Technology

Auto-Materials-&-Resources

This course covers various service manuals, service information, labor calculation, and electronic manual systems. This course focuses on the use of computerized manual systems commonly used in the automotive repair industry.

Auto-Machining-Fundamentals:

This course introduces the fundamentals of automotive machine processes and automotive fasteners, presses, pedestal grinders, arbor presses, and basic layout and tool sharpening. Includes use of appropriate charts and tables including decimal equivalent and drill and tap selection with speed and feed calculations.

Auto-Lathe-Fundamentals:

This course introduces turning operations as related to automotive machining with emphasis on work and tool holding methods. Covers related hole-making process, facing, tapping, grooving, and parting. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Auto Milling-Machine-Processes:

Covers basic milling processes, work-holding methods, cutter identification, selection and use, speeds and feeds, adapters, tool holders and application. This course also includes operation of milling machines as applied to typical automotive machining operations. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Auto Machine Shop-Upper Engine:

This course introduces theory and application used in automotive machining procedures. This course also includes use of precision measuring tools, torque wrenches, valve and seat grinding, valve guide and seat repairs, resurfacing, valve springs and cylinder head assembly.

Auto Machine Shop-Lower Engine:

This course introduces the theory and application used in automotive machining procedures. This course emphasizes precision measuring tools, torque wrenches, cylinder block boring and honing, cylinder block resurfacing, mainline checks and repairs, and connecting rod reconditioning.

Machine Shop Engine Assemble:

This course covers theory and application in automotive machining procedures. This course also includes use of precision measuring tools, torque wrenches, camshaft timing checks, clearance checks, blueprint measurement, and engine assembly and sealing techniques. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Automotive Engines 2:

This course focuses on repair and service of automotive internal combustion engines. Stresses speed and accuracy of diagnosis and repair. This course also builds on prior training. Prerequisite: or consent of instructor. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.)

Manual Drive Train and Axles 2:

This course continues the theory and service of automotive drive trains, concentrating on the diagnosis and repair of all components. Includes practical application of diagnosis, service, and repair on clutches, drive shafts, universal joints, front-wheel drive axles, manual transmissions, manual transaxles, rear axles, differentials, and four-wheel drive transfer cases. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Automatic Trans & Transaxle 1:

This course introduces the fundamentals of automatic transmission operation. This course also explains methods of gear change, power flows, and basic hydraulic principles used in automatic transmissions. Including emphasizes the service and overhaul of automatic transmissions. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Engine Performance 1:

This course covers basic principles of fuel and induction systems. Includes the basics of pressure differential, the Venturi principle, (The Venturi effect is the reduction in fluid pressure that results when a fluid flows through a constricted section (or choke) of a pipe. The Venturi effect is named after Giovanni Battista Venturi (1746–1822), an Italian physicist.) and fuel systems for gasoline and diesel engines. This course examines basic carburetor overhaul, service, and adjustment. Introduces fuel injection operation and testing, both gas and diesel. Also covers exploring basic emission controls and testing. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Engine Performance 2:

This course focuses on automotive fuel injection and ignition systems involving computer functions, inputs, commands, system diagnosis, causes of emissions, and testing of related systems. Also covers turbocharging and supercharging. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Automatic Transmissions & Transaxles 2:

This course focuses on diagnosis, repair, and service of a vehicles powertrain with emphasis on automatic transmission and automotive transaxles. Also includes electronic transmission diagnostics. Included is emphasizes speed and accuracy in diagnosis and repair. This course builds on prior training. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Electronic Vehicle Controls 1:

This course emphasizes testing, diagnosis, and the theory of automotive electrical and electronic systems. Includes computer controlled systems and sub-systems, networks, and diagnostic equipment. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Cooperative Work Experience:

This course offers placement in a business, agency, and/or industry for on-the-job training related to the interns/apprentices curriculum. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor. All guidelines will be on file in Tech Craftsman Career Building Trade School's Cooperative Work Experience office and with each curriculum's TCCBTS Instructors and Directors.

A-Cooperative Work Experience:

This course offers placement in a business, agency, and/or industry for on-the-job training related to the interns/apprentices curriculum. Prerequisite: Determined by each curriculum. All guidelines will be on file in Tech Craftsman Career Building Trade School's Cooperative Work Experience office and with each curriculum's TCCBTS Instructors and Directors.

B-Cooperative Work Experience:

This course offers placement in a business, agency, and/or industry for on-the-job training related to the interns/apprentices curriculum. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor. All guidelines will be on file in Tech Craftsman Career Building Trade School's Cooperative Work Experience office and with each curriculum's TCCBTS Instructors and Directors.

C- Cooperative Work Experience:

This course offers placement in a business, agency, and/or industry for on-the-job training related to the interns/apprentices curriculum. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor. All guidelines will be on file in Tech Craftsman Career Building Trade School's Cooperative Work Experience office and with each curriculum's TCCBTS Instructors and Directors.

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E- Cooperative Work Experience:

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F- Cooperative Work Experience:

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G- Cooperative Work Experience:

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H- Cooperative Work Experience:

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School's Cooperative Work Experience office and with each curriculum's TCCBTS Instructors and Directors.

J- Cooperative Work Experience:

Offers placement in a business, agency, and/or industry for on-the-job training related to the interns/apprentices curriculum. Prerequisite: Determined by each curriculum. All guidelines will be on file in Tech Craftsman Career Building Trade School's Cooperative Work Experience office and with each curriculum's TCCBTS Instructors and Directors.

The following courses are required because engines and transmissions will be removed to be remanufacturer, a after engine and transmission remanufacturing is complete then both, the following courses cover the reinstallations of both engines and transmissions back into vehicles on the following topics

Engine Performance 3:

This course covers theory and diagnosis of electronically controlled gasoline and diesel internal combustion engines and related emission control systems. There will be emphasizes use of diagnostic equipment and repair of computer controlled vehicles. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Electronic Vehicle Controls 2:

This course provides advanced training in the operation and testing of automotive electronic control and alternative propulsion systems with emphases on diagnostic approach and procedure. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Rechargeable Energy Storage System:

This course prepares interns/apprentices for future industry and environmental needs by providing advanced training in the operation and testing of RESS (rechargeable energy storage systems) and related sub systems currently used in the automotive industry and a variety of other green industries. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

Auto Heating and Air Condition:

This course resents the theory and operation of automotive heating and air-conditioning systems. This course also covers methods for service, repair, and troubleshooting heating and air-conditioning systems. (If any prerequisite courses are required then all interns/apprentices must be completed with a grade of C or better.) Or consent of instructor.

After these courses TCCBTS interns/apprentices will be able to completely machine each and every engine and transmission component.