

KPBSD Automotive I, II, & III Curriculum – 2017

Industry Standards		
<p>National Standards NATEF Program Automobile Accreditation Standards http://www.asealliance.org/wp-content/uploads/2016/12/2017-Auto-Program-Standards-Print-Version.pdf</p> <p>ALASKA STANDARDS ALIGNMENT: Automotive</p>	Transfer Goals	
	<p>Students will be able to independently use their learning to...</p> <ul style="list-style-type: none"> • Gain understanding and appreciation for mechanical automotive careers. • Effectively communicate using mechanical and automotive technical terminology to maintain automobiles in safe driving conditions. • Comply with personal and environmental safety practices in all areas of automotive services and repair. 	
	Meaning	
	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
	<p>Students will understand...</p> <ul style="list-style-type: none"> • Practical technological methods to a hands-on approach to problem solving. • Mechanical and automotive systems and their relationships to various technological systems. • How advanced computer technology affects vehicle performance. • How proper maintenance of a vehicle effects performance and safety of the vehicle. • How math and science principles help us diagnose and solve problems. • The basic function of the major parts of an automotive engine. • The operating principles of internal and external combustion engines. • How electricity functions in electronic components in a vehicle. • The operating principles of an automotive ignition system. • How electronics, ignition systems, and computers operate to efficiently control an automobile. • The operation of the starting and charging systems and how to diagnose their problems. 	<p>Students will keep considering...</p> <ul style="list-style-type: none"> • Why is it important to be an advocate for safe working practices? • What knowledge, skills, tools, and safety practices are required to apply practical technological methods to various automotive systems? • How do safety procedures, different automotive materials, and engineering design principals play a role in vehicle design? • Why is it important to understand relationships between systems which function together? • What is the impact of internal combustion? • How does an understanding of electricity facilitate problem solving with electrical/electronic systems? • How new technologies have impacted diagnosis and repair of operational systems? • What impact electric motors have made on transportation systems? • Why are emission controls important to our environment?

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	<ul style="list-style-type: none"> • Emission control systems can be operated by computer or engine control modules. • Fuel injection and throttle body systems control the efficiency and environmental impact of a modern automotive engine. • Cooling system parts and solution protect the engine from wear, overheating, and freezing. • Major functions from brake systems and their operational features. • Modern vehicles are controlled by anti-lock brakes, traction, and stability control. • Hydraulic and mechanical principles of a brake system. • Suspension systems affect the overall ride-ability of the vehicle. • Suspension problems will effect wear and tear of the vehicle and drivability. • Steering and alignment effect tire wear and drivability. • Steering and alignment interact to control a vehicle. • Fundamental operations of manual transmissions. • Clutches and manual transmissions operate to give a vehicle power transmission and movement. 	<ul style="list-style-type: none"> • What are sources of a vehicle’s emissions and how are they controlled? • How are modern fuel systems impacting efficiency? • Why is knowledge of thermal dynamics important in understanding cooling systems? • Why are oil rating systems used? • What are the impacts of control systems applied to braking systems? • How do components of the suspension system effect each other? • What is the role of the suspension system? • How does steering and alignment effect wear and drivability? • What effect does malfunctioning parts have on steering and alignment systems? • What impact do gear ratios have on power applied to motive force? • How does clutch operation connect and disconnect the engine and manual transmission?
Acquisition		
	<p>The Basic Automobile, Basic Hand Tools, and Safety Students will know...</p> <ul style="list-style-type: none"> • The basic parts and function of an automobile and its major functions. • The fundamental purpose of automotive systems. • The appropriate uses and practices for personal protective equipment. 	<p>Students will be skilled at...</p> <ul style="list-style-type: none"> • <u>Selecting and using appropriate hand tools and power tools.</u> • <u>Safe handling of hazardous materials.</u> • <u>Identifying and locating the most important parts of the vehicle.</u> • <u>Identifying common automotive hand tools.</u>

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	<p>Engine Fundamentals and Design (2) Students will know...</p> <ul style="list-style-type: none"> • Operating principles of internal and external combustion engines. <p>Basic Electricity/Electronics (4) Students will know...</p> <ul style="list-style-type: none"> • Principles of electricity. • How electricity functions in electronic components in a vehicle. • Basic electric and electronic terms and components. <p>Ignition Systems, Computer Systems (5) Students will know...</p> <ul style="list-style-type: none"> • The function of major ignition system components. • How a computer uses sensor inputs to determine correct outputs. • How electronics, ignition systems, and computers operate to efficiently control an automobile. • The use of scan tools and how they simplify 	<ul style="list-style-type: none"> • <u>Describing safety rules for the auto shop.</u> <p>Students will be skilled at...</p> <ul style="list-style-type: none"> • Identifying major parts of a typical automotive engine. • Describing the four stroke cycle. • Identifying different types of engine design. • Testing and diagnosing engine compression and determining the necessary action. <p>Students will be skilled at...</p> <ul style="list-style-type: none"> • <u>Solving electrical problems using Ohms’s Law.</u> • <u>Identifying basic electric and electric terms and components.</u> • <u>Checking for shorts, opens, and grounds.</u> • <u>Measuring resistance, voltage, and current.</u> • Check problems in electrical systems using a test light, voltmeter, oscilloscope, and wiring schematic. • Diagnosing and repairing lighting systems. • Repairing/replacing lights, sockets, wires, and switches. <p>Students will be skilled at...</p> <ul style="list-style-type: none"> • Conducting engine performance tests using engine analyzers and determining necessary actions. • Performing on-board diagnostics and reading trouble codes with a scan tool. • Inspecting, repairing, and replacing primary and secondary ignition components.
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	<p>reading of trouble codes.</p> <ul style="list-style-type: none"> • How to describe the input, processing, and output sections and operation. <p>Charging Systems, Starting Systems (6) Students will know...</p> <ul style="list-style-type: none"> • How charging systems replenish battery voltage. • The difference between DC alternator and AC generator. • Basic parts of the charging system and starting system. <p>Emission Controls (7) Students will know...</p> <ul style="list-style-type: none"> • A vehicle's emission is controlled by sensors, actuators, computer control modules, and the catalytic converter. • Through the vehicle's computer system, sensors, and actuators control vehicle emissions. 	<ul style="list-style-type: none"> • Adjusting ignition systems to manufacture's specifications. • Inspecting, cleaning and replacing spark timing controllers. • Removing, cleaning and inspecting alternator and determining necessary action. • Repairing/replacing internal alternator or generator components. <p>Students will be skilled at...</p> <ul style="list-style-type: none"> • <u>Cleaning and inspecting battery clamps, cables, and connectors.</u> • <u>Performing battery condition tests.</u> • <u>Charging and installing a battery.</u> • <u>Jump starting a vehicle.</u> • Repairing/replacing charging system components. <p>Students will be skilled at...</p> <ul style="list-style-type: none"> • Diagnosing emission control systems and determining necessary actions. • Diagnosing and repairing exhaust system problems. • Inspecting, cleaning, and replacing positive crankcase ventilation systems and components. • Inspecting, cleaning, and replacing air management system components. • Identifying how sensors and actuators control vehicle emissions. • Utilizing a scanner to test diagnostic trouble codes.
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	<p>Fuel Injection Systems (9) Students will know...</p> <ul style="list-style-type: none"> • The components of a fuel injection system. • The advantages of a fuel injection system vs. a carburetor system. • How electronic throttle body injection systems operate. • Fuel injection and throttle body systems control the efficiency and environmental impact of a modern automotive engine. • The advantages of gasoline injection. <p>Cooling Systems, Lubrication (10) Students will know...</p> <ul style="list-style-type: none"> • The functions of the cooling system. • Cooling system parts and solutions protect the engine from wear, overheating, and freezing. • Lubrication system parts and lubricants protect the engine from wear. • The appropriate rating of engine oil to use. • The importance of anti-freeze and coolant. <p>Brakes, Anti-Lock Brakes, Traction and Stability Control (11) Students will know...</p> <ul style="list-style-type: none"> • The major parts and operational features of an automotive brake system (including a typical anti-lock brake system). • The difference between disc and drum brakes. • Why brake systems differ from vehicle to vehicle. • Common brake problems associated with a vehicle. • The purpose of anti-lock brakes. 	<p>Students will be skilled at...</p> <ul style="list-style-type: none"> • Inspecting, cleaning, and replacing inlet air temperature control system components. • Inspecting, cleaning, and replacing intake manifold heat controls. • Comparing and contrasting the advantages, differences and similarities of various types of injection systems. <p>Students will be skilled at ...</p> <ul style="list-style-type: none"> • Inspecting and testing service engine cooling systems and components and determining necessary action. • Draining, flushing, and pressure testing the cooling system. • Diagnosing problems with the cooling and lubrication systems. <p>Students will be skilled at ...</p> <ul style="list-style-type: none"> • <u>Diagnosing and determining necessary actions of hydraulic, drum, and disc brake systems.</u> • <u>Inspecting master cylinder and hydraulic lines of the system.</u> • <u>Inspecting, testing, and replacing switches, valves, and control devices.</u> • <u>Removing, cleaning, and inspecting drum brake assemblies.</u> • <u>Repairing, replacing, and adjusting drum brake assemblies.</u>
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	<ul style="list-style-type: none"> • How traction and stability control systems help control the vehicle. <p>Suspension (12) Students will know...</p> <ul style="list-style-type: none"> • The major components of the suspension system. • The role the suspension plays in the overall drivability of the vehicle. <p>Steering (13) Students will know...</p> <ul style="list-style-type: none"> • Tire alignment angles: caster, camber, and tow. • Alignment effects steering and tire wear. • Accurate steering is effected by physical conditions, tire wear, and alignment. <p>Drive Systems (14) Students will know...</p> <ul style="list-style-type: none"> • Basic parts and the operation of an automotive clutch and manual transmission. • The types and purpose of manual transmission fluid. • Gear and gear ratios combine to change manual transmission torque, power, and speed. • Gear operating principles. 	<p>Students will be skilled at ...</p> <ul style="list-style-type: none"> • <u>Inspecting and diagnosing front suspension systems to determine necessary actions.</u> • <u>Inspecting and replacing front and rear shock absorbers and stabilizer assemblies.</u> • <u>Repairing, replacing, and adjusting wheel bearings.</u> • <u>Dismounting, inspecting, repairing, and mounting tire and wheel assemblies.</u> • <u>Rotating and balancing wheel assemblies.</u> • Performing pre-alignment inspection and measure vehicle ride height; determine necessary action. <p>Students will be skilled at ...</p> <ul style="list-style-type: none"> • <u>Diagnosing steering, tire wear, and alignment problems, and determining necessary actions.</u> • Rotate tire according to manufacturer’s recommendations. • Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly. <p>Students will be skilled at ...</p> <ul style="list-style-type: none"> • Constructing and deconstructing a clutch. • Explaining the operation of a clutch. <p style="text-align: center;"><u>Underlined skills are those identified for all three levels.</u></p> <p style="text-align: center;"><u>Level II & III students are expected to perform the additional skills not underlined.</u></p>
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Evidence	
Evaluative Criteria	Assessment Evidence
	<ul style="list-style-type: none"> • Shop Safety Quiz, Basic Hand Tools, Basic Electricity and Electronics. • Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. • Construction and testing of simple circuit board. • Ignition System Fundamentals. • Fundamentals of all automotive systems. • On-Board Diagnostics and Scan Tools. • Drive shafts and transfer cases. • Differentials. • Transaxle and front drive axle. • Engine parts analysis check list – hands-on experience. • Type written manual – service form. • NATEF.org Maintenance and Light Repair Task List. • ASE Certification – National Institute for Automotive Service Excellence.
Resources	
<p> http://www.natef.org ASE: Automotive Service Excellence www.SkillsUSA.org AK DEED Safety Manual </p>	