

# Powersports/Motorcycle Technology

Program of Studies  
2016-2017



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**Powersports/Motorcycle Technology**

Course Title	Post-Secondary Connection	Valid Course Code	Recommended Grade Level							Recommended Credit	
			6	7	8	9	10	11	12		
Advanced Engines /Drive Systems & Lab (Motorcycle)	MOT 200	<a href="#">470848</a>							X	X	1
Basic Engines / Drive Systems & Lab (Motorcycle)	MOT 142	<a href="#">470845</a>							X	X	1
Small Engine Electrical Systems And Lab	SET 200	<a href="#">470840</a>					X	X	X		1
Diagnostics And Troubleshooting & Lab (Motorcycle)	MOT 220	<a href="#">470847</a>							X	X	1
Frames And Suspensions & Lab (Motorcycle)	MOT 156	<a href="#">470846</a>							X	X	1
Intro To Motorcycles	MOT 100	<a href="#">470844</a>							X	X	1
Performance Machining / Welding & Lab (Motorcycle)	MOT 234	<a href="#">470849</a>							X	X	1

**Valid KOSSA and Industry Certification for Career Readiness**

The Valid List of KOSSA and Industry Certifications for Career Readiness can be viewed via the following link: <http://education.ky.gov/CTE/kossa/Pages/ValidKOSSAList.aspx>. The valid list is reviewed annually through the established process and publishes by June 1 for the corresponding academic year.

# POWERSPORTS/MOTORCYCLE TECHNOLOGY EDUCATION

## Overview of Powersports/Motorcycle Technology Education

### Purpose:

The vision of Kentucky Powersports/Motorcycle Technology Education is to promote safety standards and performance standards, enhance leadership, provide relevant curriculum, and to be vital to the education of all students.

Kentucky Transportation Education will:

- Operate as the center for nationally recognized industry standard training.
- Provide a critical link in school to employment or postsecondary education.
- Develop stronger relationships with the community in terms of mutual advocacy, cooperative field experiences, employment placement, and support for relevant student organizations and competitions
- Represent an important component in the education of all students.
- Require and promote critical thinking and problem solving.
- Offer an up to date curriculum based on standards that adapts to changes in the industry.
- Integrate academic skills into the Transportation Education Curriculum in order to insure that students develop written & verbal communications skills, computational skills, and scientific/math problem-solving skills.

### Career Pathways:

\*Motorcycle Maintenance and Repair Technician

### Standard Based Curriculum

The curriculum is composed of industry standards based competencies/tasks. Therefore, the teaching/learning focus is on the final results rather than the process.

### Kentucky Occupational Skill Standards

The Kentucky Occupational Skill Standards are the performance specifications that identify the knowledge, skills, and abilities an individual needs to succeed in the workplace. Identifying the necessary skills is critical to preparing students for entry into employment or postsecondary education. These standards described the necessary **occupational, academic, and employability** skills needed to enter the workforce or post-secondary education in specific career areas. There is an ongoing effort to continue to refine these standards by which exemplary Transportation Education Programs are evaluated and certified. This helps insure that curriculum meets industry specifications.

### Work Based Learning

Cooperative experience, internships, shadowing and mentoring opportunities provide depth and breadth of learning in the instructional program and allow students to apply the concepts learned in the classroom. The Work Base Learning Guide is available on the KDE webpage: [www.education.ky.gov](http://www.education.ky.gov).

### Student Organizations and Competitions

Participation in Skills USA and the Ford AAA Auto Skills Competition provides a vehicle for students to employ higher order thinking skills, to interact with high-level industry people and to further enhance their leadership skill through their participation in regional, state and national competitive events and local activities.

## TRANSPORTATION EDUCATION CAREER PATHWAYS 2016-2017

### MOTORCYCLE MAINTENANCE AND REPAIR TECHNICIAN CIP Code 47.0611.00

**PATHWAY DESCRIPTION:** A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain motorcycles and other similar powered vehicles. Includes instruction in lubrication and cooling systems, electrical and ignition systems, carburetion, fuel systems and adjustments of moving parts.

#### BEST PRACTICE CORE

#### ILP-RELATED CAREER TITLES

*Foundational Skills Necessary for Career-Ready Measure:  
(KOSSA/Industry Certification)*

*Complete (1) ONE CREDITS from the following:*

- \* 470840 Small Engine Electrical Systems And Lab

*Choose (3) THREE CREDITS from the following:*

- 470848 Advanced Engines /Drive Systems & Lab

(Motorcycle/Powersports)

- 470845 Basic Engines / Drive Systems & Lab

(Motorcycle/Powersports)

- 470847 Diagnostic and Troubleshooting & Lab

(Motorcycle/Powersports)

- 470846 Frames and Suspensions & Lab

(Motorcycle/Powersports)

Entry Level  
Powersports/Motorcycle  
Technician  
Service Advisor  
Dispatcher  
Warranty Clerk  
Sales Rep  
Service Manager

#### Advanced Coursework for Powersports/Motorcycle

1. Advanced course may be taken upon completion of a career pathway, but will not be considered credit for Perkins or Completer status.
2. Additional Co-op placement may be taken in conjunction with Advanced Courses

[470849](#) Performance Machining/Welding and Lab

[470844](#) Introduction to Motorcycles

470852 Co-Op Powersports/Motorcycle Technology

470853 Internship Powersports Motorcycle Technology

# Sample Motorcycle/Powersports Career Pathway

KENTUCKY CAREER PATHWAY/PROGRAM OF STUDY TEMPLATE									
COLLEGE/UNIVERSITY:	CLUSTER:	TRANSPORTATION		RECOMMENDED ELECTIVE COURSES		REQUIRED COURSES		CREENTIAL	SAMPLE
HIGH SCHOOL (S):	PATHWAY:	Motorcycle/ATV Repair Technology		OTHER ELECTIVE COURSES		CAREER AND TECHNICAL EDUCATION COURSES		DIPLOMA	OCCUPATIONS
	PROGRAM:	Health & PE		CAREER AND TECHNICAL EDUCATION COURSES		CAREER AND TECHNICAL EDUCATION COURSES		DEGREE	
<b>SECONDARY</b>	9	English I	Algebra I	Earth Science	World History	Health & PE	Computers	Word Processing	
	10	English II	Geometry	Biology	US History	Elective	Spreadsheets	Accounting	
	11	English III	Algebra II	Introduction to Chemistry	Foreign Language	(MOT 100) Introduction to Motorcycles FEX 100 Fundamentals of Electricity	(MOT 142) Basic Engines and Drive Systems (WPP 200) Workplace Principles		
	12	English IV	Foreign Language	Introduction to Physics	Arts & Humanities	(MOT 156) Frames and Suspensions MOT 220 Diagnostics and Troubleshooting	(MOT 234) Performance Machine and Welding (MOT 200) Advanced Engines and Troubleshooting		Motorcycle/ATV Repairer, Motorcycle Salesperson,
<b>POSTSECONDARY</b>	Year 13	Writing	Math	Social Interaction	Heritage/Humanities	Computer Literacy	(MOT 120) Motorcycle Sales and Marketing (BA 200) Small Business Management	(MOT 130) Shop Management (MOT 134) Service Requirements	
	Year 14	Oral Com	Elective	Science	Elective	Co-op	(OST 105) Introduction to Information Systems (MOT 244) Parts and Management	(ACC 201) Financial Accounting	Motorcycle/ATV Repairer, Motorcycle Salesperson, Shop Foreman, Shop Owner, Parts Sales, Sales Representative
	Year 15	AAS Degree will transfer into the BS degree in Technology Management at Morehead State University							
	Year 16	AAS Degree will transfer into the BS degree in Technology Management at Morehead State University							
<b>Required Courses</b> <span style="background-color: yellow;">Recommended Elective Courses</span> <span style="background-color: orange;">Other Elective Courses</span> Career and Technical Education Courses Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2) (◆ = High School to Comm. College) (● = Comm. College to 4-Yr. Institution) (▲ = Opportunity to test out) Mandatory Assessments, Advising, and Additional Preparation									

# **Powersports/Motorcycle Courses/Tasks**

## **Small Engine Electrical Systems and Lab**

**Valid Course Code:**

**Class: 470840**

### **Course Description**

This course presents electrical systems and their application. Basic electrical theory, including electrical pressure, current, resistance and power measured in volts, amperes, and ohms is also presented. Ohm's law will be discussed with its application to electrical circuits. Basic circuits (series, parallel, and combination of series and parallel) will be discussed.

### **Content/Process**

1. The student can demonstrate understanding of current flow in a circuit,
2. The student can define electrical terms.
3. The student can demonstrate understanding of relationship between magnetism and electrical flow.
4. The student can explain sources and uses of electricity.
5. The student can discuss the difference between a conductor and an insulator.
6. The student can identify the basic electrical measurements used in OPE including volts, amperes (amps) and ohms.
7. The student can demonstrate understanding of the nomenclature and function of electrical systems.
8. The student can identify electrical symbols used on wiring diagrams and schematics.
9. The student can demonstrate the ability to read OPE wire diagrams.
10. The student can demonstrate understanding of the nomenclature and function of electrical systems.
11. The student can identify electrical symbols used on wiring diagrams and schematics.
12. The student can demonstrate the ability to read OPE wire diagrams.
13. The student can draw a circuit diagram of a variety of selected equipment using correct symbols.
14. The student can explain how to measure current, voltage and resistance
15. The student can demonstrate the correct use of Digital Multi-Meter and DC shun.
16. The student can demonstrate proper use of analog electrical meters (Volts, Amps, and Ohms).
17. The student can perform battery specific gravity tests using two types of battery hydrometers.

18. The student can describe characteristics of electrical circuits.
19. The student can Diagram basic electrical circuits including: Series, Parallel, Series-Parallel.
20. The student can identify integrated circuit devices and explain their function.
21. The student can explain the different kinds of circuit failures.
22. The student can identify electrical/electronic circuit protection devices and explain their function.
23. The student can identify electrical circuit components and explain their function in electrical circuits.
24. The student can demonstrate the correct test procedures used to locate opens, shorts, and grounds.
26. The student can identify normally open/closed switch types.
25. The student can repair wire harness with various types of wire connectors and terminals.
- 27; The student can describe common wiring techniques for interlock switches.
28. The student can identify the connector lead on interlock switches.
29. The student can describe design, construction and operation of lead acid batteries.
30. The student can explain how storage batteries are constructed and how cells are connected to produce voltage.
31. The student can explain the common methods of rating batteries.
32. The student can describe the correct method using a battery for “jump starting”.
33. Student can explain the elements of AC and DC charging Systems.
34. Student can describe charging System Theory of Operation.
35. Student can describe alternator operation.
36. The student can explain charging system rectification.
37. The student can describe voltage regulation.
38. The student can disassemble an alternator and identify the parts and their functions.
39. The student can remove and replace 12 volt and 120 volt starter motor.
40. The student can identify and correct signs of corrosion in an electrical system.
41. The student can demonstrate the application of Silicone Dioxide on electrical connections.

43. The student can check applied voltages, circuit voltages, and voltage drops.
40. The student can identify and correct signs of corrosion in an electrical system.
42. The student can check continuity in electrical/ electronic circuits, components, and parts.
44. The student can check current flow.
45. The student can inspect, test, and replace fusible links, circuit breakers, and fuses.
46. The student can inspect, test, and replace diodes, resistors, and capacitors.
47. The student can check continuity in electrical/ electronic circuits, components in interlock circuit(s).
48. The student can demonstrate understanding of interlock systems' variations.
49. The student can analyze manufacturer interlock schematics.
50. The student can remove and replace under-flywheel alternator.
51. The student can remove, rebuild, bench test and replace alternator.
52. The student can test and replace starter relay and solenoids.
53. The student can repair or rebuild and test D.C. starting motor.
54. The student can describe basic electrical circuit problems.
55. The student can describe operation of permanent magnet starter motor.
56. Student can describe operation of a field wound starter motor.
57. The student can demonstrate key-off power drain test using DC shunt.
58. Given an electrically operated component or system with trouble symptoms installed, the student can solve the problem with the use of the proper manual and tools.

### **Connections**

- \*KOSSA
- \*New Generation Science Standards
- \*Post-Secondary: KCTCS SET 200/220
- \*CTSO's – Skills USA

**Introduction to Motorcycles**  
**Valid Course Code:**  
**470844**

**Course Description**

Explores culture and history of motorcycles. Includes possible field trips to dealerships for student exploration into motorcycle industry.

**Content/Process**

Students Will:

1. Explain knowledge of early motorcycles.
2. Identify important developments in the motorcycle industry.
3. Explain the impact of foreign companies on the motorcycle industry
4. Identify the key component of motorcycle construction.
5. Identify various motorcycle organizations, their projects and activities.
6. Identify different types of motorcycles.
7. Identify restrictions to access and speed in motorcycles.

**Connections:**

\*KOSSA  
\*New Generation Science Standards  
\*Post-Secondary: KCTCS MOT 100  
\*CTSO's – Skills USA

**Basic Engines and Drive Systems & Lab**  
**Valid Course Code:**  
**470845**

**Course Description**

Explores professional work habits, proper use of hand and power tools, service manuals, basic engine and parts identification. Covers internal combustion engines, transmissions, fuel systems, and assembly and disassembly.

**Content/Process**

Students Will:

1. Use proper tools to service an engine.
2. Demonstrate an understanding of camshaft design engines
3. Demonstrate an understanding of single cylinder engines.
4. Demonstrate an understanding of twin cylinder engines.
5. Demonstrate an understanding of multi-cylinder engines.
6. Service all types of engines using proper techniques and tools.
7. Disassemble single, twin cylinder engines.
8. Assemble single, twin cylinder engines
9. Inspect and repair pistons.
10. Inspect and repair valves.
11. Inspect and repair fuel injection systems.
12. Inspect and repair electronic systems.

**Connections:**

\*KOSSA  
\*New Generation Science Standards  
\*Post-Secondary: KCTCS MOT 142  
\*CTSO's – Skills USA

**Frames and Suspensions & Lab (Powersports/Motorcycles)**  
**Valid Course Code:**  
**470846**

**Course Description**

Focuses on the design, operation, maintenance, and geometry of motorcycles. Explores basic principles of hydraulics and lubricants. Includes basic adjustments of all frame and suspension components

**Content/Process**

Students Will:

1. Change and repair wheels and tires.
2. Demonstrate proper maintenance techniques.
3. Demonstrate an understanding of frame design.
4. List types of frames.
5. Adjust steering systems.
6. Install shocks, springs, and swing arms.
7. Change drum and disc brakes.
8. Demonstrate an understanding of hydraulic and manual brakes.
9. Repair wheel components.
10. Repair and install tires.
11. Inspect and service brake systems.
12. Inspect and repair suspensions
13. Inspect and repair frame components.

**Connections:**

\*KOSSA  
\*New Generation Science Standards  
\*Post-Secondary: KCTCS MOT 156  
CTSO's – Skills USA

**Advanced Engines / Drive Systems & Lab (Powersports/Motorcycle)**  
**Valid Course Code:**  
**470848**

**Course Description**

Develops skills for engine and transmission overhaul. Emphasizes assembly and disassembly of all components of engine and transmission.

**Content/Process**

Students Will:

1. Disassemble engine components.
2. Inspect engine components.
3. Demonstrate shop safety while conducting disassembly and reassembly.
4. Disassemble transmission components.
5. Inspect transmission components.
6. Disassemble twin and multi-cylinder engines.
7. Assemble twin and multi-cylinder engines.
8. Repair single overhead camshaft.
9. Repair dual overhead camshaft.
10. Inspect and repair fuel injection systems.
11. Inspect and repair electronic systems.

**Connections:**

\*KOSSA  
\*New Generation Science Standards  
\*Post-Secondary: KCTCS MOT 200  
\*CTSO's – Skills USA

**Diagnostics and Troubleshooting & Lab (Powersports/Motorcycle)**  
**Valid Course Code:**  
**470847**

<b>Course Description</b>
Focuses on appropriate procedures used in diagnosing customer concerns
<b>Content/Process</b>
Students Will: <ol style="list-style-type: none"><li>1 Demonstrate an understanding of service manuals.</li><li>2 Use proper equipment to diagnose a problem.</li><li>3 Identify problems.</li><li>4 Follow troubleshooting procedures.</li><li>5 Identify and use service manuals.</li><li>6 Utilize diagnostic equipment to analyze motorcycles.</li><li>7 Systematically troubleshoot problems to identify and resolve.</li></ol>
<b>Connections:</b>
*KOSSA *New Generation Science Standards *Post-Secondary: KCTCS MOT 220 *CTSO's – Skills USA

**Performance Machining and Welding & Lab**  
**Valid Course Code:**  
**470849**

**Course Description**

Explores standard and performance-machining practices associated with performance motorcycles. Includes machining practices associated with valve jobs, cylinder boring and honing, big bore kits, and cylinder head porting and polishing. Covers basic welding and weld inspection practices.

**Content/Process**

Students Will:

- 1 Demonstrate proper welding techniques.
- 2 Demonstrate an understanding of welding equipment.
- 3 Demonstrate basic machining practices associated with valve jobs and cylinder head porting and polishing.
- 4 Demonstrate proper cylinder boring and honing techniques.
- 5 Identify proper welds.
- 6 Use proper tools for each task.
- 7 Demonstrate the proper care and handling of machining tools.
- 8 Demonstrate the proper care and handling of welding tools.
- 9 Setup welding project using proper safety techniques.
- 10 Perform aluminum welds.
- 11 Setup machining project using proper safety techniques.
- 12 Clean and maintain machining equipment.
- 13 Perform basic machining operations.

**Connections:**

\*KOSSA  
\*New Generation Science Standards  
\*Post-Secondary: KCTCS MOT 234  
\*CTSO's – Skills USA