

Curriculum Standard for Mobile Equipment Maintenance and Repair

Career Cluster: Transportation, Distribution and Logistics **

Cluster Description: The planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance.

Pathway: Mobile Equipment Maintenance and Repair

Effective Term: Spring 2017 (2017*01)

Program Majors Under Pathway

Program Major / Classification of Instruction Programs (CIP) Code	Credential Level(s) Offered	Program Major Code
Agricultural Systems Technology	CIP Code 01.0205	AAS/Diploma/Certificate A60410
Alternative Transportation Technology	CIP Code: 47.0614	Diploma/Certificate D60420
Automotive Customizing Technology	CIP Code 47.0603	AAS/Diploma/Certificate A60190
Automotive Light-Duty Diesel Technology	CIP Code 47.0605	Diploma/Certificate D60430
Automotive Restoration Technology	CIP Code 47.0603	Diploma/Certificate D60140
Automotive Systems Technology	CIP Code 47.0604	AAS/Diploma/Certificate A60160
Collision Repair and Refinishing Technology	CIP Code 47.0603	AAS/Diploma/Certificate A60130
Construction Equipment Systems Technology	CIP Code 47.0302	AAS/Diploma/Certificate A60450
Diesel and Heavy Equipment Technology	CIP Code 47.0613	AAS/Diploma/Certificate A60460
Motorcycle Mechanics	CIP Code 47.0611	AAS/Diploma/Certificate A60260

Pathway Description:

Curriculums in the Mobile Equipment Maintenance and Repair pathway prepare individuals for employment as entry-level transportation service technicians. The program provides an introduction to transportation industry careers and increases student awareness of the diverse technologies associated with this dynamic and challenging field.

Course work may include transportation systems theory, braking systems, climate control, design parameters, drive trains, electrical/electronic systems, engine repair, engine performance, environmental regulations, materials, product finish, safety, steering/suspension, transmission/transaxles, and sustainable transportation, depending on the program major area chosen.

Graduates of this pathway should be prepared to take professional licensure exams, which correspond to certain programs of study, and to enter careers as entry-level technicians in the transportation industry.

*Program Description: Choose one of the following 4th paragraphs to use in conjunction with the first three paragraphs of the pathway description above for documentation used to identify each **Program Major**:*

Agricultural Systems Technology: A program that prepares individuals to maintain and repair specialized farm, ranch, and agribusiness power equipment and vehicles. Includes instruction in the principles of diesel, combustion, electrical, steam, hydraulic, and mechanical systems and their application to the maintenance of terrestrial and airborne crop-spraying equipment; tractors and hauling equipment; planting and harvesting equipment; cutting equipment; power sources and systems for silos; irrigation and pumping equipment; dairy, feeding, and shearing operations; and processing systems.

Alternative Transportation Technology: A program that prepares individuals to apply technical knowledge and skills to the maintenance of alternative fuel vehicles (AFV), hybrid electric vehicles and the conversion of standard vehicles to AFV status. Includes instruction in electrical vehicles, hybrid electric vehicles, liquefied petroleum gas (LPG)

*Within the degree program, the institution shall include opportunities for the achievement of competence in reading, writing, oral communication, fundamental mathematical skills, and basic use of computers.

vehicles, compressed natural gas (CNG) vehicles, hybrid fuel technology, electrical and electronic systems, engine performance, diagnosis and repair, and conversion/installation.

Automotive Customizing Technology: A program that prepares individuals to modify existing automotive vehicle components, fabrication techniques to create custom vehicle components, non-structural damage repair, custom painting and refinishing techniques, custom upholstery and glass removal/replacement/custom modifications, and other automotive technology related systems.

Automotive Light-Duty Diesel Technology: A program that prepares individuals to apply technical knowledge and skills to diagnose, adjust, repair, or overhaul light duty diesel vehicles under one ton classification. Includes instruction in electrical systems, diesel-electric drive, engine performance, engine repair, emission systems, and all types of diesel engines related to the light duty diesel vehicle. Includes technicians working primarily with automobile diesel engines.

Automotive Restoration Technology: A program that prepares individuals to apply technical knowledge and skills to repair, reconstruct, finish and restore automobile bodies, fenders, and external features of a wide range of classic vehicles typically from year models 1900 - 1970. Includes instruction in internal combustion engines, transmissions, brakes, restoring original sheet metal, upholstery, and wood components, rebuilding starters, generators, and painting and refinishing techniques.

Automotive Systems Technology: A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain all types of automobiles. Includes instruction in brake systems, electrical systems, engine performance, engine repair, suspension and steering, automatic and manual transmissions and drive trains, and heating and air condition systems

Collision Repair and Refinishing Technology: A program that prepares individuals to apply technical knowledge and skills to repair, reconstruct and finish automobile bodies, fenders, and external features. Includes instruction in structure analysis, damage repair, non-structural analysis, mechanical and electrical components, plastics and adhesives, painting and refinishing techniques, and damage analysis and estimating.

Construction Equipment Systems Technology: A program that prepares individuals to apply technical knowledge and skills in the field maintenance and repair of construction equipment, and in the general maintenance and overhaul of such equipment. Includes instruction in inspection, maintenance, and repair of tracks, wheels, brakes, operating controls, pneumatic and hydraulic systems, electrical circuitry, engines and in techniques of welding and brazing.

Diesel and Heavy Equipment Technology: A program that prepares individuals to apply technical knowledge and skills to repair, service, and maintain diesel engines in vehicles such as Heavy Duty Trucks over one ton classification, buses, ships, railroad locomotives, and equipment; as well as stationary diesel engines in electrical generators and related equipment.

Motorcycle Mechanics: 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.

Recreational Vehicle Maintenance and Repair Technology: A program that prepares individuals to apply technical knowledge and skills to build, test, inspect, repair, service and maintain recreational vehicles, systems, and interior and exterior components. Includes instruction in brake, hydraulic, and towing systems; electrical systems; propane systems and propane and electric appliances; carpentry; plumbing; welding; and structural frames.

I. General Education Academic Core

[Curriculum Requirements for associate degree, diploma, and certificate programs in accordance with 1D SBCCC 400.10]: Degree programs must contain a minimum of 15 semester hours including at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural sciences/mathematics. Degree programs must contain a minimum of 6 semester hours of communications. Diploma programs must contain a minimum of 6 semester hours of general education; 3 semester hours must be in communications. General education is optional in certificate programs.

Mobile Equipment Maintenance and Repair

Recommended General Education Academic Core	AAS	Diploma	Certificate
Minimum General Education Hours Required:	15 SHC	6 SHC	0 SHC
<p><i>Courses listed below are recommended general education courses for this curriculum standard. Colleges may choose to include additional or alternative general education courses to meet local curriculum needs.</i></p> <p><i>*Recommended certificate and diploma level curriculum courses. These courses may <u>not</u> be included in associate degree programs.</i></p>			
<p>Communication:</p> <ul style="list-style-type: none"> * COM 101 Workplace Communication 3 SHC COM 110 Introduction to Communications 3 SHC COM 120 Intro Interpersonal Com 3 SHC COM 231 Public Speaking 3 SHC * ENG 101 Applied Communications I 3 SHC * ENG 102 Applied Communications II 3 SHC ENG 110 Freshman Composition 3 SHC ENG 111 Expository Writing 3 SHC ENG 114 Prof Research & Reporting 3 SHC ENG 116 Technical Report Writing 3 SHC 	6 SHC	3-6 SHC	Optional
<p>Humanities/Fine Arts:</p> <ul style="list-style-type: none"> HUM 110 Technology and Society 3 SHC HUM 115 Critical Thinking 3 SHC HUM 230 Leadership Development 3 SHC PHI 230 Introduction to Logic 3 SHC PHI 240 Introduction to Logic 3 SHC 	3 SHC	0-3 SHC	Optional
<p>Social /Behavioral Sciences:</p> <ul style="list-style-type: none"> ECO 151 Survey of Economics 3 SHC ECO 251 Principles of Microeconomics 3 SHC * SOC 105 Social Relationships 3 SHC SOC 210 Introduction to Sociology 3 SHC SOC 215 Group Process 3 SHC * PSY 101 Applied Psychology 3 SHC * PSY 102 Human Relations 2 SHC PSY 118 Interpersonal Psychology 3 SHC PSY 135 Group Processes 3 SHC PSY 150 General Psychology 3 SHC 	3 SHC	0-3 SHC	Optional
<p>Natural Sciences/Mathematics:</p> <ul style="list-style-type: none"> MAT 110 Math Measurement & Literacy 3 SHC MAT 121 Algebra/Trigonometry I 3 SHC MAT 143 Quantitative Literacy 3 SHC MAT 152 Statistical Methods I 4 SHC PHY 110 Conceptual Physics 3 SHC PHY 121 Applied Physics I 4 SHC 	3 SHC	0-3 SHC	Optional

II. Major Hours. AAS, diploma, and certificate programs must include courses which offer specific job knowledge and skills. Work-based learning may be included in associate in applied science degrees up to a maximum of 8 semester hours of credit; in diploma programs up to a maximum of 4 semester hours of credit; and in certificate programs up to a maximum of 2 semester hours of credit. Below is a description of each section under Major Hours.

A. Technical Core. The technical core is comprised of specific courses which are required for all Program Majors under this Curriculum Standard. A diploma program offered under an approved AAS program standard or a certificate which is the highest credential level awarded under an approved AAS program standard must include a minimum of 12 semester hours credit derived from the curriculum core courses or core subject area of the AAS program.

B. Program Major(s). The Program Major must include a minimum of 12 semester hours credit from required subjects and/or courses. The Program Major is in addition to the technical core.

C. Other Major Hours. Other major hours must be selected from prefixes listed on the curriculum standard. A maximum of 9 semester hours of credit may be selected from each prefix listed, with the exception of prefixes listed in the core.

Mobile Equipment Maintenance and Repair	AAS	Diploma	Certificate																																												
Minimum Major Hours Required:	49 SHC	30 SHC	12 SHC																																												
<p>A. Technical Core: <i>Courses required for the diploma program major are designated with an asterisk (*).</i></p> <p>*Fundamental Transportation Skills. Choose one minimum:</p> <table> <tr> <td>TRN</td> <td>110</td> <td>Intro to Transport Tech</td> <td>2 SHC</td> </tr> <tr> <td>TRN</td> <td>111</td> <td>Chassis Maint/Light Repair</td> <td>4 SHC</td> </tr> <tr> <td>TRN</td> <td>112</td> <td>Powertrain Maint/Light Repair</td> <td>4 SHC</td> </tr> <tr> <td>TRN</td> <td>170</td> <td>PC Skills for Transp</td> <td>2 SHC</td> </tr> <tr> <td>HET</td> <td>134</td> <td>Diesel Fuel and Power Sy</td> <td>3 SHC</td> </tr> </table> <p>*Intermediate Transportation Skills. Choose one minimum:</p> <table> <tr> <td>TRN</td> <td>120</td> <td>Basic TranspElectricity</td> <td>5 SHC</td> </tr> <tr> <td>TRN</td> <td>130</td> <td>Intro to Sustainable Transp</td> <td>3 SHC</td> </tr> <tr> <td>TRN</td> <td>180</td> <td>Basic Welding for Transp</td> <td>3 SHC</td> </tr> </table> <p>Specialized Transportation Skills. Choose one minimum:</p> <table> <tr> <td>TRN</td> <td>140</td> <td>Transp Climate Control</td> <td>2 SHC</td> </tr> <tr> <td>TRN</td> <td>145</td> <td>Adv Transp Electronics</td> <td>3 SHC</td> </tr> <tr> <td>WLD</td> <td>110</td> <td>Cutting Processes</td> <td>2 SHC</td> </tr> </table>	TRN	110	Intro to Transport Tech	2 SHC	TRN	111	Chassis Maint/Light Repair	4 SHC	TRN	112	Powertrain Maint/Light Repair	4 SHC	TRN	170	PC Skills for Transp	2 SHC	HET	134	Diesel Fuel and Power Sy	3 SHC	TRN	120	Basic TranspElectricity	5 SHC	TRN	130	Intro to Sustainable Transp	3 SHC	TRN	180	Basic Welding for Transp	3 SHC	TRN	140	Transp Climate Control	2 SHC	TRN	145	Adv Transp Electronics	3 SHC	WLD	110	Cutting Processes	2 SHC	19-27 SHC	17-21 SHC	
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<p>B. Program Major(s). <i>For both AAS Degree and Diploma, select one program major plus additional courses from the prefixes listed within the same program major for a minimum of (12) semester hours of credits.</i></p> <p>Agricultural Systems Technology</p> <table> <tr> <td>ELN</td> <td>112</td> <td>Diesel Electronics System</td> <td>4 SHC</td> </tr> <tr> <td>PME</td> <td>111</td> <td>Harvest and Spraying Equip</td> <td>4 SHC</td> </tr> <tr> <td>PME</td> <td>112</td> <td>Consumer Products</td> <td>2 SHC</td> </tr> <tr> <td>PME</td> <td>121</td> <td>Component Controls</td> <td>2 SHC</td> </tr> </table> <p>Alternative Transportation Technology</p> <table> <tr> <td>ATT</td> <td>115</td> <td>Green Trans Safety and Service</td> <td>2 SHC</td> </tr> <tr> <td>ATT</td> <td>125</td> <td>Hybrid-Electric Transportation</td> <td>4 SHC</td> </tr> <tr> <td>ATT</td> <td>140</td> <td>Emerging Transp Techn</td> <td>3 SHC</td> </tr> </table>	ELN	112	Diesel Electronics System	4 SHC	PME	111	Harvest and Spraying Equip	4 SHC	PME	112	Consumer Products	2 SHC	PME	121	Component Controls	2 SHC	ATT	115	Green Trans Safety and Service	2 SHC	ATT	125	Hybrid-Electric Transportation	4 SHC	ATT	140	Emerging Transp Techn	3 SHC																			
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Automotive Customizing Technology			
AUB	111	Painting and Refinishing I	4 SHC
AUC	111	Auto Customizing Research	3 SHC
AUC	112	Auto Custom Fabrication	4 SHC
Automotive Light-Duty Diesel Technology			
LDD	112	Intro Light-Duty Diesel	3 SHC
LDD	116	Diesel Electric-Drive	4 SHC
LDD	181	LDD Fuel Systems	4 SHC
Automotive Restoration Technology			
ARS	112	Auto Restoration Research	3 SHC
ARS	113	Automotive Upholstery	4 SHC
ARS	114	Restoration Skills I	4 SHC
Automotive Systems Technology			
AUT	141	Suspension and Steering Sys	3 SHC
AUT	151	Brake Systems	3 SHC
AUT	181	Engine Performance I	3 SHC
Collision Repair and Refinishing Technology			
AUB	111	Painting and Refinishing I	4 SHC
AUB	121	Non-Structural Damage I	3 SHC
AUB	131	Structural Damage I	4 SHC
Construction Equipment Systems Technology			
HYD	134	Hyd/Hydrostatic Construction	4 SHC
PME	117	Equipment Braking Systems	3 SHC
PME	118	Undercarriage Components	2 SHC
PME	221	Const Equip Servicing	2 SHC
Diesel and Heavy Equipment Technology			
HET	110	Diesel Engines	6 SHC
HET	114	Power Trains	5 SHC
HET	125	Preventive Maintenance	2 SHC
		Or	
MRN	121	Marine Engines	4 SHC
MRN	147	Marine Power Trains	4 SHC
MRN	150	Adv. Marine Electricity	5 SHC
Motorcycle Mechanics			
MCM	111	Motorcycle Mechanics	7 SHC
MCM	114	Motorcycle Fuel Systems	5 SHC
MCM	115	Motorcycle Chassis	3 SHC

C. Other Major Hours.

To be selected from the following prefixes:

ACC, ARS, ATR, ATT, AUB, AUC, AUM, AUT, BMS, BPR, BTB, BUS, CIS, CSC, CTS, DBA, DDF, DEA, DFT, ELC, ELN, FBG, GRA, HET, HYD, ISC, LDD, LOG, MAC, MCM, MEC, MKT, MPS, MRN, MSM, NOS, PHY, PME, RCT, RVM, SST, TDP, TRN, WBL, WEB, and WLD

Up to two semester hour credits may be selected from ACA.

Up to three semester hour credits may be selected from the following prefixes: ARA, ASL, CHI, FRE, GER, ITA, JPN, LAT, POR, RUS and SPA.

III. Other Required Hours

A college may include courses to meet graduation or local employer requirements in a certificate (0-1 SHC), diploma (0-4 SHC), or an associate in applied science (0-7 SHC) program. These curriculum courses shall be selected from the Combined Course Library and must be approved by the System Office prior to implementation. Restricted, unique, or free elective courses may not be included as other required hours.

IV. Employability Competencies

Fundamental competencies that address soft skills vital to employability, personal, and professional success are listed below. Colleges are encouraged to integrate these competencies into the curriculum by embedding appropriate student learning outcomes into one or more courses or through alternative methods.

- A. Interpersonal Skills and Teamwork** – The ability to work effectively with others, especially to analyze situations, establish priorities, and apply resources for solving problems or accomplishing tasks.
- B. Communication** – The ability to effectively exchange ideas and information with others through oral, written, or visual means.
- C. Integrity and Professionalism** – Workplace behaviors that relate to ethical standards, honesty, fairness, respect, responsibility, self-control, criticism and demeanor.
- D. Problem-solving** – The ability to identify problems and potential causes while developing and implementing practical action plans for solutions.
- E. Initiative and Dependability** – Workplace behaviors that relate to seeking out new responsibilities, establishing and meeting goals, completing tasks, following directions, complying with rules, and consistent reliability.
- F. Information processing** – The ability to acquire, evaluate, organize, manage, and interpret information.
- G. Adaptability and Lifelong Learning** – The ability to learn and apply new knowledge and skills and adapt to changing technologies, methods, processes, work environments, organizational structures and management practices.
- H. Entrepreneurship** – The knowledge and skills necessary to create opportunities and develop as an employee or self-employed business owner.

*An **Employability Skills Resource Toolkit** has been developed by NC-NET for the competencies listed above. Additional information is located at: <http://www.nc-net.info/employability.php>

**The North Carolina Career Clusters Guide was developed by the North Carolina Department of Public Instruction and the North Carolina Community College system to link the academic and Career and Technical Education programs at the secondary and postsecondary levels to increase student achievement. Additional information about Career Clusters is located at: http://www.nc-net.info/NC_career_clusters_guide.php or <http://www.careertech.org>.

Summary of Required Semester Hour Credits (SHC) for each credential:

	AAS	Diploma	Certificate
Minimum General Education Hours	15	6	0
Minimum Major Hours	49	30	12
Other Required Hours	0-7	0-4	0-1
Total Semester Hours Credit (SHC)	64-76	36-48	12-18