

Agricultural Technician Technology Mississippi Curriculum Framework

Program CIP: 01.0201 – Agricultural Mechanics and Equipment/Machine Technology

July 2015

VALIDATION DRAFT



Published by:

Mississippi Community College Board
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The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

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CONTENTS

RESEARCH ABSTRACT	5
REVISION HISTORY	5
ADOPTION OF NATIONAL CERTIFICATION STANDARDS	6
ARTICULATION	8
TECHNICAL SKILLS ASSESSMENT	8
ONLINE AND BLENDED LEARNING OPPORTUNITIES.....	8
INSTRUCTIONAL STRATEGIES.....	8
ASSESSMENT STRATEGIES	8
CREDIT BY EXAMINATION.....	8
PROGRAM DESCRIPTION.....	9
SUGGESTED COURSE SEQUENCE	10
Accelerated Pathway Credential	10
Year One Required Courses.....	10
Summer Term Required Courses	11
Year Two Required Courses	11
Technical Electives	12
General Education Core Courses.....	13
AGRICULTURAL TECHNICIAN TECHNOLOGY COURSES.....	14
AMT 1122 Agricultural Mechanics Fundamentals.....	14
AMT 1213 Basic Electrical/Electronics Systems.....	16
AMT 1223 Advanced Electrical/Electronics Systems.....	17
AMT 1313 Basic Power Trains	18
AMT 1323 Advanced Power Trains.....	19
AMT 1511 Principles of Air Conditioning.....	22
AMT 1613 Basic Hydraulic System.....	23
AMT 231(1-3) Cotton Harvesting Equipment	25
AMT 241(1-3) Hay Harvesting Equipment	26
AMT 2512 Spray Equipment.....	27
AMT 2623 Advanced Hydraulic Systems	28
AMT 2712 Row Crop Planting Systems	29
AMT 2812 Compact Engines and Equipment	30
AMT 2823 Service Repair Center Management and Operations.....	31
AMT 291(1-3) Special Problems in Agricultural Technician Technology	32
AMT 292(1-6) Supervised Work Experience in Agricultural Technician Technology.....	33
RECOMMENDED TOOLS AND EQUIPMENT	34
RECOMMENDED INSTRUCTIONAL AIDS	36
CURRICULUM DEFINITIONS AND TERMS	37

RESEARCH ABSTRACT

The curriculum framework in this document reflects the changes in the workplace and a number of other factors that impact local vocational–technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U.S. Department of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

This curriculum was last validated and approved in 2011. In the summer of 2015, the Office of Curriculum and Instruction (OCI) met with several different business and industries in Northern MS. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Industry members stated the curriculum was strong, but wanted to encourage students who complete the program to continue becoming certified in additional agricultural areas.

REVISION HISTORY

2015-Office of Curriculum & Instruction, Mississippi Community College Board

2011-Research & Curriculum Unit, Mississippi State University

ADOPTION OF NATIONAL CERTIFICATION STANDARDS

At this time, the program does not contain national standards. Those who complete the second year shall be awarded an Associate of Applied Science Degree in Agricultural Technician Technology. Graduates of this program are employed by agricultural equipment dealers, industrial, rental, and retail and/or agricultural businesses. Students can also sit for the John Deere certification exam and obtain certification through John Deere.

INDUSTRY JOB PROJECTION DATA

Farm equipment mechanics' occupations require an education level of a postsecondary career and technical certificate. There is a 5.82% increase in occupational demand at the regional level and a 8.63% increase at the state level. Median annual income for mechanics is \$33,155.20 at the state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Farm Equipment Mechanics	Postsecondary Career and Technical Award

Table 2: Occupational Overview

	Region	State	United States
2010 Occupational Jobs	361	452	28460
2020 Occupational Jobs	382	491	30418
Total Change	21	39	1958
Total % Change	5.82%	8.63%	6.88%
2010 Median Hourly Earnings	\$15.94	\$15.94	\$16.17
2010 Median Annual Earnings	\$33,155.20	\$33,155.20	\$33,633.60
Annual Openings	2	3	195

Table 3: Occupational Breakdown

Description	2010 Jobs	2020 Jobs	Annual Openings	2010 Hourly Earnings	2010 Annual Earnings 2,080 Work Hours
Farm Equipment Mechanics	361	382	2	\$15.94	\$33,155.20
TOTAL	361	382	2	\$15.94	\$33,155.20

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Farm Equipment Mechanics	21	5.82%	8.63%	6.88%

ARTICULATION

Articulation credit from Secondary Agricultural Power and Machinery to Postsecondary Agricultural Technician Technology will be awarded beginning upon implementation of this curriculum by the college. Courses to be articulated include Agricultural Mechanics Fundamentals (AMT 1123) with the stipulation of passing the MS-CPAS2 according to MCCB guidelines.

Articulated Secondary Course	Articulated Postsecondary Course
[S] Agriculture Power and Machinery (Program CIP: 01.0204 – Agricultural Power Machinery Operation)	AMT 1123 – Agricultural Mechanics Fundamentals

TECHNICAL SKILLS ASSESSMENT

Students will be assessed using the *Agricultural Technician Technology* MS-CPAS2 test. The MS-CPAS2 blueprint can be found at <http://www.rcu.msstate.edu/>. All students will test after year two of their program. A test covering all material will be administered to AAS track students upon completion of their program. If there are questions regarding assessment of this program, please contact the Agriculture Instructional Design Specialist at the Research and Curriculum Unit at 662.325.2510.

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

INSTRUCTIONAL STRATEGIES

Instructional strategies for faculty members implementing the curriculum can be found through the Office of Curriculum and Instruction's professional development.

ASSESSMENT STRATEGIES

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

CREDIT BY EXAMINATION

Credit by examination will be considered for courses that correlate with the Agricultural Technician Technology Program.

PROGRAM DESCRIPTION

Agricultural Technician Technology is an instructional program that prepares individuals to select, operate, maintain, service, and use agricultural/industrial power units, machinery, and equipment. Included is instruction in engine design, use, maintenance, and repair techniques. The program covers internal combustion engines service and overhaul, electrical systems, hydraulic systems, power trains, air conditioning, grain harvesting equipment, spray equipment, row crop planting systems, cotton harvesting equipment, hay harvesting equipment, compact engines equipment, servicing, cutting and welding, and service repair center management and operations.

Graduates of the program shall be issued an Associate of Applied Science Degree in Agricultural Technician Technology. Students from this program are employed by agricultural equipment dealers, industrial, rental, and retail concerns and agricultural businesses.

The Agricultural Technician Technology program works very closely with Deere and Company's standards and program alignment. Industry standards referenced are adapted from the Ag Tech program as published by Deere and Company, Moline, IL. Ag Tech is a nationally recognized training program for farm power and machinery technicians.

SUGGESTED COURSE SEQUENCE

Accelerated Pathway Credential

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown	
			Lecture	Lab		Lecture	Lab
AMT 1122	Agricultural Mechanics Fundamentals	2	1	2	45	15	30
AMT 1313	Basic Power Trains	3	2	2	60	30	30
AMT 1213	Basic Electrical/Electronics Systems	3	2	2	60	30	30
	Electives	7					
	Total	15					

Year One Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Contact Hours	Contact Hour Breakdown		
			Lecture	Lab	Clinical/ Internship		Lecture	Lab	Clinical/ Internship
AMT 1122	Agricultural Mechanics Fundamentals	2	1	2		45	15	30	
AMT 1313	Basic Power Trains	3	2	2		60	30	30	
AMT 1213	Basic Electrical/Electronics Systems	3	2	2		60	30	30	
AMT 1414	Basic Engines	4	2	4		90	30	60	
AMT 2812	Compact Engines and Equipment	2	1	2		45	15	30	
AGT 1161	Introduction to Spatial Information Systems	1	1			15	15		
AMT 1613	Basic Hydraulic Systems	3	2	2		60	30	30	
AMT 292(6)	Supervised Work Experience in Agricultural Technician Technology	6			18	270			270
	Instructor Approved technical electives	6							
	Total	30							

Summer Term Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Contact Hours	Contact Hour Breakdown		
			Lecture	Lab	Clinical/ Internship		Lecture	Lab	Clinical/ Internship
AMT 2623	Advanced Hydraulic Systems	3	1	4		75	15	60	
AMT 1511	Principles of Air Conditioning	1		2		30		30	
AMT 2111	Grain Harvesting Equipment	1		2		30		30	
AMT 2411	Hay Harvesting Equipment	1		2		30		30	
AMT 2311	Cotton Harvesting Equipment	1		2		30		30	
	Total	7							

Year Two Required Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Contact Hours	Contact Hour Breakdown		
			Lecture	Lab	Clinical/ Internship		Lecture	Lab	Clinical/ Internship
AMT 1323	Advanced Power Trains	3	1	4		75	15	60	
AMT 1223	Advanced Electrical/ Electronics Systems	3	1	4		75	15	60	
AMT 2926	Supervised Work Experience in Agricultural Technician Technology	6			18	270			270
AMT 1424	Advanced Diesel Engines	4	2	4		90	30	60	
AMT 2912	Special Problems in Agricultural Technician Technology	2		4		60		60	
AMT 2712	Row Crop Planting Systems	2	1	2		45	15	30	
AMT 2512	Spray Equipment	2		4		60		60	
AMT 1162	Introduction to Spatial Information Systems	2	1	2		45	15	30	
	Instructor approved technical electives	5							
	Total	29							

Technical Electives

Course Number	Course Name	Semester Credit Hours	SCH Breakdown			Total Contact Hours	Contact Hour Breakdown		
			Lecture	Lab	Clinical/ Internship		Lecture	Lab	Clinical/ Internship
AGT 1613	Agricultural Records	3				45	45		
AGT 1714	Applied Soils-Conservation and Use	4				60	60		
AGT 1413	Principles of Agricultural Management	3				45	45		
AGT 1513	Principles of Agricultural Marketing	3				45	45		
AMT 241(1-3)	Hay Harvesting Equipment	1-3	1-2	2		30-60	15-30	30	
AMT 231(1-3)	Cotton Harvesting Equipment	1-3	1-2	2		30-60	15-30	30	
AMT 2512	Spray Equipment	2	1	2		45	15	30	
AMT 2712	Row Crop Planting Systems	2	1	2		45	15	30	
AMT 2823	Service Repair Center Management and Operations	3	2	2		60	30	30	
AMT 291(1-3)	Special Problems in Agricultural Technician Technology	1-3		2-6		30-90		30-90	
AMT 292(1-6)	Supervised Work Experience in Agricultural Technician Technology	1-6			3-18	45-270			45-270
WBL 191(1-3) WBL 192(1-3) WBL 193(1-3) WBL 291(1-3) WBL 292(1-3) WBL 293(1-3)	Work-Based Learning	1-6			3-18	45-270			45-270
CPT 1113	Fundamentals of Microcomputer Applications	3	3						
	Other instructor approved courses								

General Education Core Courses

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement¹ describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

General Education Courses

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Contact Hour Breakdown	
			Lecture	Lab		Lecture	Lab
	Humanities/Fine Arts	3					
	Social/Behavioral Sciences	3					
	Natural science/mathematics	3					
	Instructor approved academic courses per local college requirement.	6					
	TOTAL	15					

¹

Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from <http://www.sacscoc.org/pdf/2012PrinciplesOfAccreditation.pdf>

AGRICULTURAL TECHNICIAN TECHNOLOGY COURSES

Course Number and Name: **AMT 1122 Agricultural Mechanics Fundamentals**

Description: A study of safe practices and procedures used in Agricultural Mechanics. Included are personal and shop safety, safe use of tools and equipment, flammable materials and fire safety, disposal of hazardous materials, and a comprehensive safety exam. An introduction to agricultural mechanics occupations, the development of employability skills, the utilization of technical media, and the identification and use of fasteners and hardware identified in the agricultural mechanics industry.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain safety rules for shop activity.
 - a. Demonstrate proper and safe use of tools in the shop.
 - b. Demonstrate proper and safe use of test equipment.
 - c. Demonstrate proper and safe use of lifting and support equipment.
 - d. Demonstrate eye safety procedures.

2. Explain procedures for identifying, storing, and disposing of hazardous materials.
 - a. Describe procedures for storage and disposal of flammable materials.
 - b. Describe storage and disposal procedures for hazardous materials.

3. Explain the use of the Materials Safety Data Sheet (MSDS) form.
 - a. Review an MSDS form to identify safe handling and disposal procedures for hazardous materials.
 - b. Demonstrate procedures for posting and filing MSDS forms.

4. Explain procedures for applying fire safety in the agricultural mechanics shop.
 - a. Identify location of firefighting equipment.
 - b. Identify classes of fires and associated equipment for each class.
 - c. Identify exit locations in case of emergency.
 - d. Ensure 100% pass rate on comprehensive safety exam.

5. Explain the requirements and working conditions for employment in the agricultural mechanics industry.
 - a. Research and describe employment opportunities in the agricultural mechanics industry.
 - b. Describe education and experience requirements for employment in the agricultural mechanics industry.
 - c. Describe earning and working conditions in the agricultural mechanics industry.
 - d. Describe employability skills necessary for employment in the agricultural mechanics industry.
 - e. Complete a job application.
 - f. Complete a personal résumé.
 - g. Conduct a job interview.

6. Use technical media in agricultural mechanics.
 - a. Read and interpret technical manuals to obtain specifications and procedures for repair and maintenance of agricultural equipment.
 - b. Use parts manuals and electronic media to identify and procure correct parts for repair.

7. Identify fasteners and hardware used in agricultural mechanics.
 - a. Identify units of measure in SAE and metric systems.
 - b. Identify special applications fasteners used in agricultural mechanics.

8. Identify special tools and test instruments for use in agricultural mechanics.
 - a. Identify electronics test instruments.
 - b. Identify hydraulic test instruments.
 - c. Identify special tools used in agricultural mechanics.

Course Number and Name: **AMT 1213 Basic Electrical/Electronics Systems**

Description: This is a course designed to provide a study of electrical/electronic systems and repair as it relates to agricultural power machinery and equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the physical laws of electricity and magnetism.
 - a. Identify the physical laws of electricity.
 - b. Describe the physical laws of magnetism.

2. Demonstrate procedures for the use of test equipment.
 - a. Measure voltage.
 - b. Measure current.
 - c. Measure resistance.

3. Demonstrate procedures to maintain and use storage batteries.
 - a. Describe safety procedures for the storage battery.
 - b. Test the storage battery for voltage and cranking amperage.
 - c. Service the storage battery.

4. Demonstrate procedures for use of electrical switches and actuators.
 - a. Design a circuit using electrical switches.
 - b. Design a circuit using actuators.

Course Number and Name: **AMT 1313 Basic Power Trains**

Description: This is a course designed to provide a study of machines and the principles upon which they operate in the transmission of power.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate machines used for transmitting power in agricultural equipment.
 - a. Demonstrate mechanical advantage and applications of the lever.
 - b. Demonstrate mechanical advantage and applications of the wheel and axle.
 - c. Demonstrate mechanical advantage and applications of the pulley and belts.
 - d. Demonstrate mechanical advantage and applications of the inclined plane.
 - e. Demonstrate mechanical advantage and applications of the screw.
 - f. Demonstrate mechanical advantage and applications of the wedge.

2. Explain the elements of differential and axle assemblies.
 - a. Identify parts associated with differential systems.
 - b. Identify parts associated with axle systems.

3. Demonstrate methods of power transmission and braking.
 - a. Demonstrate the transmission of power through direct drive.
 - b. Demonstrate the transmission of power through pulleys and belts.
 - c. Demonstrate the transmission of power through chains and sprockets.
 - d. Demonstrate the transmission of power through gears and shafts.
 - e. Demonstrate the transmission of power through electrically and/or hydraulically controlled systems.

Course Number and Name: **AMT 1323 Advanced Power Trains**

Description: This is a course designed to provide an advanced study of machines and the principles upon which they operate in the transmission of power.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Disassemble and reassemble clutch packs.
 - a. Disassemble a clutch pack.
 - b. Inspect clutch parts for wear and damage.
 - c. Reassemble clutch pack.

2. Repair and replace component parts of a machine including eccentrics, shafts, bearings, fasteners, springs, seals, and "O" rings.
 - a. Disassemble machines to inspect component parts.
 - b. Inspect component parts of a machine.
 - c. Determine if component parts meet manufacturer's specifications.
 - d. Reassemble machines according to manufacturer's specifications.

3. Describe the operation and maintenance of hydrostatic power trains.
 - a. Describe basic principles of hydrostatic power transmission.
 - b. Identify benefits of hydrostatic transmission.
 - c. Disassemble, inspect, and reassemble a hydrostatic transmission.
 - d. Diagnose power train components and systems.

Course Number and Name: AMT 1414 Basic Engines

Description: This is a course designed to provide a study of the theory of operation disassembly/assembly, parts identification, service, and repair of gasoline engines used in compact equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the theory of operation of an internal combustion engine.
 - a. Describe events that occur in each cycle of the four-stroke cycle engine.
 - b. Describe the elements necessary for the operation of a four-stroke cycle engine.
2. Explain the compression ratio.
 - a. Identify the formula used to calculate a compression ratio.
 - b. Calculate the compression ratio.
3. Service the fuel system in internal combustion engines.
 - a. Identify the components of the fuel system.
 - b. Service a gasoline fuel system.
4. Compare the ignition systems found in gasoline engines.
 - a. Describe how the spark ignition system functions.
5. Explain the function of the lubrication system.
 - a. Identify the components of the lubrication system.
 - b. Describe the function of the components of the lubrication system.
 - c. Identify types of lubricants.
6. Explain the function of the cooling system.
 - a. Identify the components of the cooling system.
 - b. Describe the function of the components of the cooling system.
 - c. Identify types of coolants.
7. Explain the function of the air intake system.
 - a. Identify the components of the air intake system.
 - b. Describe the function of the components of the air intake system.
 - c. Identify types of filters.
8. Explain the function of the exhaust system.
 - a. Identify the components of the exhaust system.
 - b. Describe the function of the components of the exhaust system.
9. Disassemble, analyze components, and assemble an engine.
 - a. Disassemble a gasoline engine.
 - b. Identify engine parts.
 - c. Analyze cause of engine failure.
 - d. Inspect parts and determine wear or damage using precision measuring tools.
 - e. Reassemble according to manufacturer's specifications.

Course Number and Name: AMT 1424 Advanced Diesel Engines

Description: This is a course designed to provide a study of the theory of operation disassembly/assembly, parts identification, service, and repair of diesel engines.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Service the fuel system in internal combustion engines.
 - a. Identify the components of the diesel fuel system.
 - b. Service a diesel fuel system.
 - c. Describe how the compression ignition system functions.
2. Explain the function of the lubrication system.
 - a. Identify the components of the lubrication system.
 - b. Describe the function of the components of the lubrication system.
 - c. Identify types of lubricants.
3. Explain the function of the cooling system.
 - a. Identify the components of the cooling system.
 - b. Describe the function of the components of the cooling system.
4. Explain the function of the air intake system.
 - a. Identify the components of the air intake system.
 - b. Describe the function of the components of the air intake system.
 - c. Identify types of filters.
5. Explain the function of the exhaust system.
 - a. Identify the components of the exhaust system.
 - b. Describe the function of the components of the exhaust system.
 - c. Describe the function of a turbo charger.
 - d. Explain the function of the after treatment system.
6. Disassemble, analyze components, and assemble an engine.
 - a. Disassemble a diesel engine.
 - b. Identify engine parts.
 - c. Analyze cause of engine failure.
 - d. Inspect parts, and determine wear or damage using precision measuring tools.
 - e. Reassemble according to manufacturer's specifications.

Course Number and Name: **AMT 1511 Principles of Air Conditioning**

Description: This is a course designed to provide principles and service of air conditioning systems used on agricultural equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1		2	30

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Describe the principles of refrigeration.
 - a. Describe the properties of refrigerant.
 - b. Describe an evaporator, a condenser, a compressor, an expansion valve, and a thermostat.
 - c. Describe the requirements for environmentally approved refrigerants allowed under federal and state regulations, including licensing.

2. Perform preventative maintenance on air conditioning systems.
 - a. Clean an air conditioning system.
 - b. Visually inspect components of an air conditioning system.
 - c. Perform leak detection on an air conditioning system.
 - d. Check refrigerant level.

3. Service an air conditioning system.
 - a. Diagnose electrical components and systems that are related to the AC system.
 - b. Recover refrigerant.
 - c. Inspect component parts.
 - d. Evacuate the air conditioning system.
 - e. Recharge the air conditioning system.
 - f. Recheck for leaks.

4. Explain the guidelines and requirements for the MACS Certification.

Course Number and Name: **AMT 1613 Basic Hydraulic System**

Description: This course is designed to provide basic theory and application of hydraulic systems in agricultural machinery and equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain the physical laws of hydraulics.
 - a. Define kinetic energy.
 - b. Define potential energy.
2. Identify types of hydraulic pumps.
 - a. Identify a constant displacement pump.
 - b. Identify a variable displacement pump.
3. Identify and describe the functions of hydraulic control valves.
 - a. Identify the types of hydraulic valves.
 - b. Describe the functions of hydraulic valves.
4. Identify and describe the functions of hydraulic actuators.
 - a. Identify types of hydraulic actuators.
 - b. Describe the functions of hydraulic actuators.
5. Explain the functions of hydraulic systems.
 - a. Describe the function of an open center hydraulic system.
 - b. Describe the function of a closed center hydraulic system.
 - c. Read and interpret hydraulic schematics.

Course Number and Name: ATT 211 (1-3) Grain Harvesting Equipment

Description: This is a course designed to provide procedures for the inspection, adjustment, repair and lubrication of grain harvesting equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	2	4	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify safety procedures used on grain harvesting equipment.
 - a. Identify safety procedures for using lifting and support equipment.
 - b. Identify safety procedures for servicing moving parts.
2. Service a combine header.
 - a. Check the sickle blades and repair or replace.
 - b. Check the auger fingers and repair or replace.
 - c. Check and adjust reel height.
 - d. Check and adjust all related gears, chains, and bearings.
3. Service the combine cylinder and concave.
 - a. Check the bearing and repair or replace.
 - b. Check the spike teeth or rasp bars, and repair or replace.
 - c. Adjust cylinder to concave.
 - d. Set cylinder rpm.
4. Service combine separators.
 - a. Inspect and adjust cleaning shoe and sieves.
 - b. Inspect and adjust cleaning fan.
 - c. Inspect and adjust clean grain and tailing elevator.
5. Service hydraulic system, final drives, and engines as specified by the manufacturer.
 - a. Inspect, check fluid levels, and change filter on hydraulic systems.
 - b. Inspect and check fluid levels on final drives.
 - c. Inspect, check fluid levels, and change filter and oil on engine.
6. Service combine fan system.
 - a. Inspect fan for worn blades, bearings, and belts and replace as needed.
 - b. Adjust fan speed to specifications.
7. Lubricate combine.
 - a. Read and interpret manufacturer's service manual for maintenance schedule and locations for lubrication.
 - b. Consult manufacturer's service manual for types of oils and lubricants for use on combines.

Course Number and Name: AMT 231(1-3) Cotton Harvesting Equipment

Description: This is a course designed to provide advanced skills and knowledge related to the functions, maintenance, and repair of cotton picker drums and support systems.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1		2	30
2	1	2	45
3	2	2	60

National Assessment:

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify safety procedures used on cotton harvesting equipment.
 - a. Identify safety procedures for using lifting and support equipment.
 - b. Identify safety procedures for servicing moving parts.
 - c. Inspect and adjust all shields, safety devices, and guards found on cotton harvesting equipment.

2. Set up and adjust cotton harvesting equipment for field operation.
 - a. Identify functions of the components of cotton harvesting equipment.
 - b. Describe the flow of cotton from the header to the basket.
 - c. Set up cotton picker for field operation.
 - d. Adjust cotton picker for field operation according to manufacturer's specifications.

3. Repair and lubricate cotton harvesting equipment.
 - a. Inspect cotton harvesting equipment for wear or damage.
 - b. Repair and lubricate cotton harvesting equipment according to manufacturer's specifications.

Course Number and Name: AMT 241(1-3) Hay Harvesting Equipment

Description: This is a course designed to provide advanced skills and knowledge related to the procedures for inspection, adjustment, repair, and lubrication of hay harvesting equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1		2	30
2	1	2	45
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify safety procedures used on hay harvesting equipment.
 - a. Identify safety procedures for using, lifting, and supporting equipment.
 - b. Identify safety procedures for servicing moving parts.
 - c. Inspect and adjust all shields, safety devices, and guards found on hay harvesting equipment.
2. Identify and describe different types of equipment used in hay harvesting.
 - a. Identify and describe the different types of mowers used in hay harvesting.
 - b. Identify and describe the different types of rakes used in hay harvesting.
 - c. Identify and describe the different types of balers used in hay harvesting.
3. Set up and adjust hay equipment for field operation.
 - a. Attach hay equipment for field operation.
 - b. Set up for field operation.
 - c. Adjust for field operation according to manufacturer's specifications.
4. Inspect, service and repair hay equipment.
 - a. Inspect hay equipment for wear or damage.
 - b. Service and repair hay equipment according to manufacturer's specifications.

Course Number and Name: **AMT 2512 Spray Equipment**

Description: A basic course to provide students with knowledge on the selection, assembly, inspection, adjustment, calibration, and repair of spray equipment including safety procedures and environmental concerns.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2		4	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify safety procedures used on spray equipment.
 - a. Identify safety procedures for using lifting and support equipment.
 - b. Identify safety procedures for servicing moving parts.
 - c. Identify MSDS functions and sheet symbols.

2. Service mechanical components of a sprayer.
 - a. Identify mechanical components of a sprayer.
 - b. Disassemble and assemble a pressure manifold.
 - c. Disassemble and assemble a pump.
 - d. Disassemble and assemble a valve.
 - e. Disassemble and assemble a spray body.

3. Explain procedures to calibrate a sprayer.
 - a. Identify methods of calibration including distance method and time method.
 - b. Calculate quantity of spray material to be applied.
 - c. Select spray nozzles for various applications and environmental considerations.
 - d. Calibrate a sprayer for a given application rate.
 - e. Describe principles of operation of a variable rate spray applicator.

Course Number and Name: **AMT 2623 Advanced Hydraulic Systems**

Description: This course will provide knowledge about advanced theory and application of hydraulic systems in agricultural machinery and equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Perform service and tests on hydraulic systems.
 - a. Pressure test an open center hydraulic system.
 - b. Flow test an open center hydraulic system.
 - c. Service an open center hydraulic system.
 - d. Pressure test a closed center hydraulic system.
 - e. Flow test a closed center hydraulic system.
 - f. Service a closed center hydraulic system.

2. Disassemble, inspect, repair, and reassemble radial piston pumps.
 - a. Identify components of radial piston pumps.
 - b. Inspect components of radial piston pumps for wear and damage.
 - c. Reassemble radial piston pumps according to manufacturer’s specifications.

3. Disassemble, inspect, repair, and reassemble axial piston pumps.
 - a. Identify components of axial piston pumps.
 - b. Inspect axial piston pump components for wear and damage.
 - c. Reassemble axial piston pumps according to manufacturer’s specifications.

4. Identify, inspect, and service hydraulic control valve assemblies.
 - a. Describe types and functions of hydraulic control valve assemblies.
 - b. Disassemble, inspect, and reassemble hydraulic control valves.

Course Number and Name: AMT 2712 Row Crop Planting Systems

Description: This course will provide knowledge about setup, inspection, adjustment, and service of row crop planting equipment including an introduction to variable rate application equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate procedures to set up row crop planting equipment.
 - a. Identify drive components on row crop planters.
 - b. Identify covering components on row crop planters.
 - c. Identify the metering devices on row crop planters.
 - d. Set up planters for row width and crop.
 - e. Describe use of no-till planting equipment.
 - f. Set up no-till planting equipment.
2. Demonstrate procedures to adjust row crop planting equipment.
 - a. Identify adjustments on row crop planters.
 - b. Describe adjustment of the metering devices on row crop planters.
 - c. Perform adjustments on row crop planters.
 - d. Calibrate fertilizer application equipment.
3. Demonstrate procedures to service row crop planting equipment.
 - a. Identify service to perform on row crop planters.
 - b. Describe service of the metering devices on row crop planters.
 - c. Perform service on row crop planters.
4. Describe and discuss the principles of precision agriculture technology.
 - a. Identify the components of a precision agriculture program.
 - b. Discuss factors to be considered in establishing a variable rate prescription for a given crop and field.

Course Number and Name: **AMT 2812 Compact Engines and Equipment**

Description: This course will provide knowledge about Inspection, service, and repair of compact equipment.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify safety procedures used on compact equipment.
 - a. Identify safety procedures for using lifting and supporting compact equipment.
 - b. Identify safety procedures for servicing moving parts.
 - c. Inspect and adjust all shields, safety devices, and guards.

2. Inspect, troubleshoot, and service compact equipment.
 - a. Perform periodic maintenance on compact equipment.
 - b. Troubleshoot, inspect, and repair compact equipment.

3. Troubleshoot and repair major component parts of compact equipment.
 - a. Inspect, troubleshoot, and repair/adjust pumps on compact equipment.
 - b. Inspect, troubleshoot, and repair/adjust gear boxes on compact equipment.
 - c. Inspect, troubleshoot, and repair/adjust mower decks.
 - d. Inspect, troubleshoot, and repair/adjust PTO and belt drives.

Course Number and Name: **AMT 2823 Service Repair Center Management and Operations**

Description: This course will provide knowledge about management and daily operations of an agricultural equipment service center including record-keeping, reference materials, tool and equipment maintenance, and service scheduling.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Maintain manual and computerized records.
 - a. Utilize repair orders.
 - b. Record time sheets.
 - c. Prepare parts tickets.

2. Manage shop tools, equipment, and facilities.
 - a. Demonstrate inventory of special tools using manual and computerized record systems.
 - b. Demonstrate maintenance and storage procedures for tools and equipment.

3. Maintain reference library, including technical media and computerized systems.
 - a. Demonstrate inventory of reference library.
 - b. Demonstrate procedures for keeping publications current.
 - c. Demonstrate ability to locate information in the reference library using manual and computerized systems.

4. Schedule service using manual and computerized systems.
 - a. Demonstrate ability to prepare a service order.
 - b. Demonstrate ability to identify services required.
 - c. Plan repair jobs according to the time schedule published by the manufacturer.

Course Number and Name: AMT 291(1-3) Special Problems in Agricultural Technician Technology

Description: A course to provide students with an opportunity to utilize skills and knowledge gained in other Agricultural Mechanics Technology courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1		2	30
2		4	60
3		6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan that details the activities and projects to be completed.
 - a. Use a written plan that details the activities and projects to be completed.
 - b. Perform written occupational objectives in the special problem.
2. Assess accomplishment of objectives.
 - a. Prepare daily written assessments of accomplishment of objectives.
 - b. Present weekly written reports to the instructor of activities performed and objectives accomplished.
3. Use and follow a set of written guidelines for the special problem.
 - a. Develop and follow a set of written guidelines for the special problem.

Course Number and Name: AMT 292(1-6) **Supervised Work Experience in Agricultural Technician Technology**

Description: A course that is a cooperative program between industry and education designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of one semester hour per 45 industrial contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1		3	135
2		6	270
3		9	405
4		12	540
5		15	675
6		18	810

Prerequisite: Instructor Approved

Student Learning Outcomes:

For every task completed in this course the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

1. Follow a set of instructor-written guidelines for the supervised work experience program.
2. Apply skills needed to be a viable member of the workforce.
 - a. Prepare a description of skills to be developed in the supervised work experience program.
 - b. Practice skills needed to be a viable member of the workforce.
3. Practice human relationship skills in the supervised work experience program.
4. Practice positive work habits, responsibilities, and ethics.
5. Develop written occupational objectives in the supervised work experience program.
6. Assess performance of occupational skills.
 - a. Prepare daily written assessments of work performance as specified in the occupational objectives.
 - b. Present weekly written reports to the instructor of activities performed and objectives accomplished.

RECOMMENDED TOOLS AND EQUIPMENT

CAPITALIZED ITEMS

1. Air compressor (1)
2. Air conditioning charging and recovery unit (1)
3. Band saw, metal (1)
4. Cabinet, ultraviolet (With safety glasses) (1)
5. Cabinet, flammable storage (1)
6. Computers with printers (1 per student)
7. Drill press (½-in. chuck) (1)
8. Dynamometer, diesel (1)
9. Engines, diesel (3 cylinder or larger) (2)
10. Engines, compact (Variety) (8)
11. Implement, PTO driven (1)
12. Jacks, floor (5 T) (2)
13. Machine, valve grinder (With accessories) (1)
14. Meter, flow with an adapter kit (1)
15. Plasma arc cutter (With accessories) (5/8 in. capacity) (1)
16. Porta power (With accessories) (1)
17. Press, hydraulic (25 T) (1)
18. Saw, metal cutoff (14 in.) (1)
19. Stands, diesel engine (2)
20. System, global positioning equipment with accessories (1)
21. Tester, compression with adapters (Diesel) (1)
22. Tester, hydraulic pressure with adapters (1)
23. Tester, injection nozzle (With adapters) (1)
24. Tester, hydraulic system (1)
25. Tractor, diesel powered (Current technology) (1)
26. Trainer, hydraulics (1)
27. Washer, parts (1)
28. Washer, pressure (Portable 3,500 PSI) (1)
29. Welder, TIG (Water cooled with accessories) (1)
30. Welder, portable (AC/DC generator) (1)
31. Welders, AC/DC (With accessories) (Set) (5)
32. Welders, MIG (With accessories) (2)

NON-CAPITALIZED ITEMS

1. Air conditioning R-12 and R134A gauge set (1)
2. Air conditioning leak detection test set (1)
3. Analyzer, charging and starting (1)
4. Anvil (150 lb) (1)
5. Bar, pry (Set) (1)
6. Benches, work (Wood and metal) (12)
7. Booster pack, portable (750 cranking amps) (1)
8. Calipers, dial (2)
9. Can, radiator fill (1)
10. Cans, fuel storage (2)
11. Carts, oxyfuel cutting and welding (2)
12. Charger, battery (1)
13. Chisel, cold (Set) (1)
14. Clamps, C (8 in.) (10)
15. Clamps, vise grip (Set) (2)

16. Compressors, ring (Small engine) (2)
17. Compressor, ring (Diesel) (1)
18. Compressors, valve spring (Small engine) (2)
19. Compressor, valve spring (Diesel) (1)
20. Creepers (2)
21. Cutter, valve seat (Small engine) (1)
22. Dial indicators (2)
23. Drills, portable electric (½ in.) (2)
24. Drill, twist (Set 1/16 in. to 1 in.) (1)
25. Drills, portable electric (3/8 in.) (2)
26. Files, set (2)
27. Flare tool, tubing (1)
28. Gauge, compression (Small engine) (1)
29. Gauge, compression (Diesel with adapters) (1)
30. Gauge, telescoping (Set) (1)
31. Grinder, portable (8 in.) (1)
32. Grinder, portable (5 in.) (1)
33. Grinder, bench (8 in.) (1)
34. Guns, paint (With accessories) (2)
35. Gun, grease (1)
36. Gun, electric soldering (1)
37. Hacksaws (4)
38. Hammer, shop (8 lb) (1)
39. Hammers, ball-peen (Set) (4)
40. Hammers, shop (3 lb) (2)
41. Hoist, shop (3 T or larger) (1)
42. Holders, flywheel (2)
43. Hone, cylinder (Diesel) (1)
44. Hone, cylinder (Small engine) (1)
45. Hoses, air pressure (6)
46. Jack, hydraulic bottle (10 T) (1)
47. Jackstands (10 T) (6)
48. Jackstands (2 T) (6)
49. Jackstands (5 T) (6)
50. Levels (4 ft) (2)
51. Mallets, soft face (4)
52. Micrometer, outside (Set) (1)
53. Micrometer, inside (Set) (1)
54. Multimeters, digital (4)
55. Oxyfuel cutting and welding (With accessories) (Set) (2)
56. Pliers, set (Slip-joint, needle-nose, adjustable jaw, diagonal cutters, lockring, and snapping) (5)
57. Puller, jaw (Set) (1)
58. Puller, sleeve (1)
59. Punch, metal (Set) (1)
60. Racks, metal storage (4)
61. Regulators, air compressor (2)
62. Sanders, portable pneumatic (2)
63. Sanders, hand (3-in. by 5-in. pad) (5)
64. Sanders, hand (4½-in. by 9-in. pad) (5)
65. Screwdriver, Phillips sets (4)
66. Screwdriver, flat blade sets (4)
67. Screwdriver, torx (Set) (1)
68. Sharpener, twist drill (1)
69. Shields, face (5)
70. Squares, L (2)

71. Tables, welding portable (2)
72. Tachometer, handheld (1)
73. Tank, used oil storage (1)
74. Tap and die set (SAE) (1)
75. Tap and die set (Metric) (1)
76. Tape measures (¾ in. by 25 ft) (4)
77. Tape measures (½ in. by 12 ft) (10)
78. Tester, battery (1)
79. Tester, ignition system (Small engine) (1)
80. Tester, coolant system (1)
81. Testers, circuit (2)
82. Tester, spark (Small engine) (1)
83. Tool, engine bearing (1)
84. Tool, bearing separator (Set) (1)
85. Tool, bushing driving (Set) (1)
86. Tool, clutch alignment (Set) (1)
87. Tool, seal driving (Set) (1)
88. Tool, bearing driving (Set) (1)
89. Tool, bolt extractor (Set) (1)
90. Vacuum, shop (1)
91. Vise, drill press (1)
92. Vises (6 in.) (4)
93. Wire cutters (10)
94. Wrenches, clutch (2)
95. Wrenches, Allen (Set SAE) (4)
96. Wrenches, Allen (Set metric) (4)
97. Wrenches, combination (Set ¼ in. to 1¼ in. and metric) (4)
98. Wrenches, combination (Set 1¼ in. to 2 in.) (1)
99. Wrenches, ignition (Set) (4)
100. Wrench, line (Set) (1)
101. Wrench, impact socket set (3/8-in. drive SAE and metric) (1)
102. Wrenches, socket set (¾-in. drive 7/8 in. to 2¼ in. Deep and shallow and metric sizes) (4)
103. Wrenches, torque (1/4-in. drive SAE and metric inch/pounds) (2)
104. Wrenches, torque (½-in. drive SAE and metric foot/pounds, 25 to 250 ft/lb) (2)
105. Wrench, pneumatic ratchet (3/8-in. drive) (1)
106. Wrench, impact pneumatic (½-in. drive) (1)
107. Wrench, impact socket set (½-in. drive SAE and metric) (1)
108. Wrenches, socket set (¼-in. drive ¼ in. to ½ in. deep and shallow and metric sizes) (4)
109. Wrenches, socket set (3/8-in. drive ¼ in. to 7/8 in. deep and shallow and metric sizes) (4)
110. Wrenches, socket set (½-in. drive 3/8 in. to 1¼ in. deep and shallow and metric sizes) (4)
111. Wrenches, pipe (Set 8 in. to 24 in.) (1)

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. Microcomputer integrated software package (word processing, spreadsheet, and database)
2. LCD video projector
3. Digital camera
4. Projector, overhead (1)
5. TV(Flat screen) (1)
6. VCR/CD/DVD (1)
7. Interactive display board(1)
8. Instructor's laptop computer (rugged design) (1)

CURRICULUM DEFINITIONS AND TERMS

- Course Name – A common name that will be used by all community colleges in reporting students
- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students
- Classification – Courses may be classified as the following:
 - Career Certificate Required Course – A required course for all students completing a career certificate.
 - Technical Certificate Required Course – A required course for all students completing a technical certificate.
 - Technical Elective – Elective courses that are available for colleges to offer to students.
- Description – A short narrative that includes the major purpose(s) of the course
- Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course
- Corequisites – A listing of courses that may be taken while enrolled in the course
- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
 - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
 - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
 - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
 - Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
 - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas
- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses AND a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.
- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

- Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
- Revising or extending the student learning outcomes
- Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)