

## 2011 Mississippi Curriculum Framework

### Postsecondary Agricultural Technician Technology

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

#### Direct inquiries to

LaNell Kellum, PhD  
Director for Career and Technical Education  
Mississippi Community College Board  
3825 Ridgewood Road  
Jackson, MS 39211  
601.432.6518  
[lkellum@mccb.edu](mailto:lkellum@mccb.edu)

Scott Kolle  
Instructional Design Specialist  
Research and Curriculum Unit  
P.O. Drawer DX  
Mississippi State, MS 39762  
662.325.2510  
[scott.kolle@rcu.msstate.edu](mailto:scott.kolle@rcu.msstate.edu)

#### Published by

Office of Career and Technical Education  
Mississippi Department of Education  
Jackson, MS 39205

Research and Curriculum Unit  
Mississippi State University  
Mississippi State, MS 39762

The Mississippi Department of Education, Office of Career and Technical Education does not discriminate on the basis of race, color, religion, national origin, sex, age, or disability in the provision of educational programs and services or employment opportunities and benefits. The following office has been designated to handle inquiries and complaints regarding the non-discrimination policies of the Mississippi Department of Education: Director, Office of Human Resources, Mississippi Department of Education, 359 North West Street, Suite 203, Jackson, Mississippi 39201, 601.359.3511.

## Acknowledgments

### Writing Team

Jeremy Massey, Northwest Mississippi Community College, Senatobia, MS  
 Shane Louwerens, Northwest Mississippi Community College, Senatobia, MS  
 Joe Galey, Mississippi Delta Community College, Moorhead, MS

### RCU Staff

Scott Kolle, Instructional Design Specialist  
 Ashleigh Barbee Murdock, Editor  
 Serita Theresa Wheeler, Curriculum and Assessment Research Specialist

### Professional Curriculum Advisory Team

Advisory teams at the following:

- Northwest Mississippi Community College, Senatobia, MS
- Mississippi Delta Community College, Moorhead, MS

Standards in this document are based on information from the following organizations:

### Standards for Mississippi Postsecondary Agricultural Mechanics Technology Programs

Standards for Agricultural Equipment Technicians were adapted from the John Deere Ag Tech Competency list, published by Deere and Company, Moline, IL.

### Related Academic Standards

CTB/McGraw-Hill LLC. (2005). *Tests of adult basic education, forms 7 and 8*. Monterey, CA: Author. Reproduced with permission of CTB/McGraw-Hill LLC. TABE is a registered trademark of The McGraw-Hill Companies, Inc. Copyright © 2005 by CTB/McGraw-Hill LLC. Reproduction of this material is permitted for educational purposes only.

### 21st Century Skills

Reproduced with permission of the Partnership for 21st Century Skills. Further information may be found at [www.21stcenturyskills.org](http://www.21stcenturyskills.org).

## Preface

### Agricultural Technician Technology Research Synopsis

Information listed at the end of each course was considered during the revision process. The John Deere Ag Tech Web site and the FFA content were especially useful in providing insight into trends and issues in the field. These references are suggested for use by instructors and students during the study of the topics outlined.

Industry advisory team members from colleges throughout the state were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program include a positive attitude, being at work every day and on time, and having reading and writing skills to complete work orders and other forms related to the agricultural technician field. Occupational-specific skills stated include knowledge of the fundamentals, identification of basic parts, operation, and troubleshooting. Safety practices emphasized include practicing all agricultural technician safety rules and wearing the proper safety equipment.

#### Needs of the Future Workforce

The Agricultural Mechanics occupation is projected to grow slower than average in the United States, 7% and much faster than average in Mississippi, 17% (EMSI, 2011). Job prospects will be best for individuals with formal training and during the warmer months (US Bureau of Labor Statistics, 2010).

#### *Finance and Accounting Employment Projections and Earnings*

| Region         | 2010 Jobs | 2020 Jobs | Change | % Change | Openings | 2010 Median Hourly Earnings |
|----------------|-----------|-----------|--------|----------|----------|-----------------------------|
| Regional Total | 432       | 504       | 72     | 17%      | 190      | \$15.17                     |
| National Total | 32,163    | 34,380    | 2,217  | 7%       | 10,871   | \$16.04                     |

#### Curriculum

The following national standards were referenced in each course of the curriculum:

- CTB/McGraw-Hill LLC *Tests of Adult Basic Education, forms 7 and 8* Academic Standards
- *21st Century Skills*
- *John Deere Ag Tech Standards*

Industry and instructor comments, along with current research, were considered by the curriculum revision team during the revision process, and changes were made as needed and appropriate. Many of the skills and topics noted in the research were already included in the curriculum framework. Specific changes made to the curriculum at the January 18, 2011, curriculum revision meeting included the following:

- Moved AMT 2113- Grain Harvesting to electives and in its place programs will choose from AMT 2113 - Grain Harvesting Equipment, AMT 2413 - Hay Harvesting Equipment, or AMT - 2313 Cotton Harvesting Equipment.

- Adjusted the course hours for AMT 2113 - Grain Harvesting Equipment, AMT 2413 - Hay Harvesting Equipment, or AMT - 2313 Cotton Harvesting Equipment from a 1-hr course to 1-3 hr for each course.
- Moved AMT 2513 - Spray Systems to the electives
- Competencies and objectives were reviewed to ensure accuracy and appropriateness.
- Clarification to content that relates to the Ag Tech Standards
- The Recommended Tools and Equipment list was updated to reflect the tool list for successful competition of Ag Tech theory and content.

### 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 one of their program. A second test covering the second year 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.

No alternate assessments are available at this time

### Professional Learning

It is suggested that instructors participate in professional learning related to the following concepts:

- How to use the program Blackboard site
- Differentiated instruction – To learn more about differentiated instruction, please go to [http://www.paec.org/teacher2teacher/additional\\_subjects.html](http://www.paec.org/teacher2teacher/additional_subjects.html), and click on Differentiated Instruction. Work through this online course, and review the additional resources.

### Program Exceptions

No program exceptions exist at this time.

### 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 State Board for Community and Junior Colleges (MCCB) guidelines.

| Articulated Secondary Course   | Articulated Postsecondary Course              |
|--|---|
| [S] Agriculture Power and Machinery<br>(Program CIP: 01.0204 – Agricultural Power Machinery Operation) | AMT1123 – Agricultural Mechanics Fundamentals |

Statewide Guidelines on Articulated Credit

*Eligibility*

- To be eligible for articulated credit, a student must do the following:
  - Complete the articulated Secondary Career Program.
  - Score 80% or higher on the Mississippi Career Planning and Assessment System (MS CPAS) in his or her secondary program of study.
- To be awarded articulated credit, a student must do the following:
  - Complete application for articulated credit at the community or junior college.
  - Enroll in the community or junior college within 18 months of graduation.
  - Successfully complete 12 non-developmental career–technical or academic credit hours in the corresponding articulated postsecondary career–technical program of study.

#### *How MS CPAS will be documented*

- The Research and Curriculum Unit of Mississippi State University will provide the SBCJC a list of all secondary CTE students scoring at or above the 80 percentile for the articulated programs.
- The SBCJC will forward the list of students eligible for articulated credit to the colleges.

#### *Transcripting of Articulated Credit*

- Students must complete 12 non-developmental career–technical or academic credit hours in the articulated postsecondary career–technical program of study before the articulated credit is transcripted.
- No grade will be given on the transcript for articulated courses; only hours granted will be transcripted (thus resulting in no change in quality points).

#### *Time Limit*

- MS-CPAS2 scores will be accepted to demonstrate competencies for up to 18 months after high school graduation.

#### *Cost*

- No costs will be assessed on hours earned through articulated credit.

## Foreword

As the world economy continues to evolve, businesses and industries must adopt new practices and processes in order to survive. Quality and cost control, work teams and participatory management, and an infusion of technology are transforming the way people work and do business. Employees are now expected to read, write, and communicate effectively; think creatively, solve problems, and make decisions; and interact with each other and the technologies in the workplace. Career–technical programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflects these changes in the workplace and a number of other factors that impact local career–technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and career 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 career and technical educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Referenced throughout the courses of the curriculum are the 21st Century Skills, which were developed by the Partnership for 21st Century Skills, a group of business and education organizations concerned about the gap between the knowledge and skills learned in school and those needed in communities and the workplace. A portion of the 21st Century Skills addresses learning skills needed in the 21st century, including information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills. Another important aspect of learning and working in the 21st century involves technology skills. The International Society for Technology in Education, developer of the National Educational Technology Standards (NETS), was a strategic partner in the Partnership for 21st Century Skills. Each postsecondary program of instruction consists of a program description and a suggested sequence of courses that focus on the development of occupational competencies. The MS-CPAS2 blueprints are based upon the suggested course sequences to allow for year 1 and year 2 assessments for all exit options. Please refer to the blueprint online. Each career–technical course in this sequence has been written using a common format, which includes the following components:

- Course Name – A common name that will be used by all community and junior 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–technical core – A required career–technical course for all students
  - Area of concentration (AOC) core – A course required in an area of concentration of a cluster of programs
  - Career–technical elective – An elective career–technical course
  - Related academic course – An academic course that provides academic skills and knowledge directly related to the program area

- Academic core – An academic course that is required as part of the requirements for an associate’s degree
- Description – A short narrative that includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester
- 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
- Competencies and Suggested Objectives – A listing of the competencies (major concepts and performances) and the suggested student objectives 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 district. 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 a minimum 15-semester-credit-hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:
  - 3 semester credit hours (sch)                      Math/Science Elective
  - 3 semester credit hours                              Written Communications Elective
  - 3 semester credit hours                              Oral Communications Elective
  - 3 semester credit hours                              Humanities/Fine Arts Elective

- 3 semester credit hours                      Social/Behavioral Science Elective

It is recommended that courses in the academic core be spaced out over the entire length of the program, so that students complete some academic and career–technical courses each semester. Each community or junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- Career–technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:

- Adding new competencies and suggested objectives
- Revising or extending the suggested objectives for individual competencies
- 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)

In addition, the curriculum framework as a whole may be customized by doing the following:

- Resequencing courses within the suggested course sequence reflecting the new assessment format
- Developing and adding a new course that meets specific needs of industries and other clients in the community or junior college district (with MCCB approval)
- Utilizing the career technical elective options in many of the curricula to customize programs



## Table of Contents

|   |    |
|---|----|
| Acknowledgments.....  | 2  |
| Preface.....  | 3  |
| Foreword.....   | 6  |
| Program Description.....  | 10 |
| Suggested Course Sequence.....  | 11 |
| Agricultural Technician Technology Courses.....                       | 14 |
| Agricultural Mechanics Fundamentals.....                              | 14 |
| Basic Electrical/Electronics Systems.....                             | 18 |
| Advanced Electrical/Electronics Systems.....                          | 21 |
| Basic Power Trains.....   | 24 |
| Advanced Power Trains.....  | 27 |
| Basic Engines.....  | 30 |
| Advanced Engines.....   | 33 |
| Principles of Air Conditioning.....                                   | 36 |
| Basic Hydraulic Systems.....  | 39 |
| Grain Harvesting Equipment.....                                       | 42 |
| Cotton Harvesting Equipment.....                                      | 45 |
| Hay Harvesting Equipment.....   | 48 |
| Spray Equipment.....  | 51 |
| Advanced Hydraulic Systems.....                                       | 54 |
| Row Crop Planting Systems.....  | 57 |
| Compact Engines and Equipment.....                                    | 60 |
| Service Repair Center Management and Operations.....                  | 63 |
| Special Problem in Agricultural Mechanics Technology.....             | 66 |
| Supervised Work Experience in Agricultural Technician Technology..... | 67 |
| Work-Based Learning I, II, III, IV, V, and VI.....                    | 68 |
| Recommended Tools and Equipment.....                                  | 69 |
| Appendix A: Standards for Agricultural Technician Technology.....     | 73 |
| Appendix B: Related Academic Standards.....                           | 76 |
| Appendix C: 21 <sup>st</sup> Century Skills.....                      | 77 |

## 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 first-year program shall be issued a Certificate of Agricultural Technician, and 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 concerns and agricultural businesses.

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\***  
**Agricultural Technician Technology**  
**Career Certificate**

|  |  |
|--|--|
| 3 sch Agricultural Mechanics<br>Fundamentals (AMT 1123)<br>3 sch Basic Engines (AMT 1413)<br>3 sch Basic Electrical/Electronics Systems<br>(AMT 1213)<br>3 sch Basic Power Trains (AMT 1313)<br>3 sch Compact Engines and Equipment<br>(AMT 2813)<br>3 sch Electives<br><hr style="width: 20%; margin-left: 0;"/> 18 sch | 3 sch Advanced Engines (AMT 1423)<br>3 sch Advanced Electrical/Electronics<br>Systems (AMT 1223)<br>1 sch Principles of Air Conditioning (AMT<br>1511)<br>3 sch Basic Hydraulic Systems (AMT<br>1613)<br>6 sch Electives<br><hr style="width: 20%; margin-left: 0;"/> 16 sch |
|--|--|

\* Students who lack entry-level skills in math, English, science, and so forth will be provided related studies.

**ELECTIVES**

Any other instructor approved elective  
 Agricultural Records (AGT 1613)  
 Applied Soils-Conservation and Use (AGT 1714)  
 Cotton Harvesting Equipment (AMT 231[1-3])  
 Fundamentals of Microcomputer Applications (CPT 1113)  
 Grain Harvesting equipment (AMT 211[1-3])  
 Hay Harvesting Equipment (AMT 241[1-3])  
 Principles of Agricultural Management (AGT 1413)  
 Principles of Agricultural Marketing (AGT 1513)  
 Row Crop Planting Systems (AMT 2712)  
 Special Problem in Agricultural Technician Technology [(AMT 291(1-3))]  
 Spray Equipment (AMT 2513)  
 Supervised Work Experience in Agricultural Technician Technology [AMT 292(1-6)]  
 Work-Based Learning I, II, III, IV, V, and VI [WBL 191(1-3), WBL 192(1-3),  
           WBL 193(1-3), WBL 291(1-3), WBL 292(1-3), and WBL 293(1-3)]

**Suggested Course Sequence\***  
**Agricultural Technician Technology**  
**Associate of Applied Science Degree**

FIRST YEAR

|   |  |
|---|--|
| 3 sch Agricultural Mechanics<br>Fundamentals (AMT 1123)<br>3 sch Basic Engines (AMT 1413)<br>3 sch Basic Electrical/Electronics Systems<br>(AMT 1213)<br>3 sch Basic Power Trains (AMT 1313)<br>3 sch Computer Elective+<br>3 sch Written Communications Elective<br><hr style="width: 10%; margin-left: 0;"/> 18 sch | 3 sch Advanced Engines (AMT 1423)<br>3 sch Advanced Electrical/Electronic<br>Systems (AMT 1223)<br>3 sch Basic Hydraulic Systems (AMT<br>1613)<br>3 sch Advanced Power Trains (AMT<br>1323)<br>3 sch Math/Science Elective<br>3 sch Elective<br><hr style="width: 10%; margin-left: 0;"/> 18 sch |
|---|--|

SECOND YEAR

|  |   |
|--|---|
| 3 sch Harvesting Equipment Elective+<br>3 sch Compact Engines and Equipment<br>(AMT 2813)<br>1 sch Principles of Air Conditioning (AMT<br>1511)<br>3 sch Humanities/Fine Arts Elective<br>3 sch Oral Communications Elective<br>3 sch Elective<br><hr style="width: 10%; margin-left: 0;"/> 16 sch | 3 sch Row Crop Planting Systems (AMT<br>2712)<br>3 sch Advanced Hydraulic Systems (AMT<br>2623)<br>3 sch Social/Behavioral Science Elective<br>3 sch AMT Elective<br>3 sch Elective<br><hr style="width: 10%; margin-left: 0;"/> 15 sch |
|--|---|

\* Students who lack entry-level skills in math, English, science, and so forth will be provided related studies.

## ELECTIVES

Any other instructor approved elective

Agricultural Records (AGT 1613)

Applied Soils-Conservation and Use (AGT 1714)

Computer Electives (Choose 1)

- CPT 1113 Fundamentals of Microcomputer Applications,
- CSC 1113 Introduction to Computer Concepts
- ATE 1113 Science and Technology

Fundamentals of Microcomputer Applications (CPT 1113)

Harvesting Equipment Electives

- Cotton Harvesting Equipment (AMT 231[1-3])
- Grain Harvesting Equipment (AMT 211[1-3])
- Hay Harvesting Equipment (AMT 241[1-3])

Introduction to Spatial Information Systems (AGT 1163)

Principles of Agricultural Management (AGT 1413)

Principles of Agricultural Marketing (AGT 1513)

Service Repair Center Management and Operations (AMT 2823)

Special Problem in Agricultural Technician Technology [(AMT 291(1-3)]

Spray Equipment (AMT 2513)

Supervised Work Experience in Agricultural Technician Technology [AMT 292(1-6)]

Work-Based Learning I, II, III, IV, V, and VI [WBL 191(1-3), WBL 192(1-3), WBL 193(1-3), WBL 291(1-3), WBL 292(1-3), and WBL 293(1-3)]

## Agricultural Technician Technology Courses

**Course Name:** Agricultural Mechanics Fundamentals

**Course Abbreviation:** AMT 1123

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**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 (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b> |  |
|--|--|
| 1.   | Explain safety rules for shop activity. <sup>(DOK2, SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Demonstrate proper and safe use of tools in the shop. <sup>(DOK2)</sup><br>b. Demonstrate proper and safe use of test equipment. <sup>(DOK2)</sup><br>c. Demonstrate proper and safe use of lifting and support equipment. <sup>(DOK2)</sup><br>d. Demonstrate eye safety procedures. <sup>(DOK1)</sup>  |
| 2.   | Explain procedures for identifying, storing, and disposing of hazardous materials. <sup>(DOK1, SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Describe procedures for storage and disposal of flammable materials. <sup>(DOK1)</sup><br>b. Describe storage and disposal procedures for hazardous materials. <sup>(DOK1)</sup>  |
| 3.   | Explain the use of the Materials Safety Data Sheet (MSDS) form. <sup>(DOK1, SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Review an MSDS form to identify safe handling and disposal procedures for hazardous materials. <sup>(DOK1)</sup><br>b. Demonstrate procedures for posting and filing MSDS forms. <sup>(DOK1)</sup>   |
| 4.   | Explain procedures for applying fire safety in the agricultural mechanics shop. <sup>(DOK1, SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Identify location of firefighting equipment. <sup>(DOK1)</sup><br>b. Identify classes of fires and associated equipment for each class. <sup>(DOK1)</sup><br>c. Identify exit locations in case of emergency. <sup>(DOK1)</sup><br>d. Ensure 100% pass rate on comprehensive safety exam. <sup>(DOK2)</sup>  |
| 5.   | Explain the requirements and working conditions for employment in the agricultural mechanics industry. <sup>(DOK2, SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Research and describe employment opportunities in the agricultural mechanics industry. <sup>(DOK2)</sup><br>b. Describe education and experience requirements for employment in the agricultural mechanics industry. <sup>(DOK2)</sup><br>c. Describe earning and working conditions in the agricultural mechanics industry. <sup>(DOK1)</sup><br>d. Describe employability skills necessary for employment in the agricultural mechanics industry. <sup>(DOK1)</sup> |

|  |
|--|
| industry. <sup>(DOK1)</sup><br>e. Complete a job application. <sup>(DOK1)</sup><br>f. Complete a personal résumé. <sup>(DOK1)</sup><br>g. Conduct a job interview. <sup>(DOK1)</sup>   |
| 6. Use technical media in agricultural mechanics. <sup>(DOK3,SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Read and interpret technical manuals to obtain specifications and procedures for repair and maintenance of agricultural equipment. <sup>(DOK3)</sup><br>b. Use parts manuals and electronic media to identify and procure correct parts for repair. <sup>(DOK2)</sup> |
| 7. Identify fasteners and hardware used in agricultural mechanics. <sup>(DOK1,SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Identify units of measure in SAE and metric systems. <sup>(DOK1)</sup><br>b. Identify special applications fasteners used in agricultural mechanics. <sup>(DOK1)</sup>   |
| 8. Identify special tools and test instruments for use in agricultural mechanics. <sup>(DOK1,SAF, HYD, ELT, HVA, EFS, POW, HAR, TSC, SER, TEC)</sup><br>a. Identify electronics test instruments. <sup>(DOK1)</sup><br>b. Identify hydraulic test instruments. <sup>(DOK1)</sup><br>c. Identify special tools used in agricultural mechanics. <sup>(DOK1)</sup>                                  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

|     |  |
|-----|--|
| SAF | Safety   |
| HYD | Hydraulics   |
| ELT | Electrical Systems   |
| HVA | Mobile Heating, Ventilation, and Air Conditioning (HVAC) Systems |
| EFS | Engines and Fuel Systems   |
| POW | Power trains   |
| HAR | Harvesting Systems   |
| TSC | Tillage, Seeding, and Chemical Application Systems               |
| SER | Service Department Policies and Procedures                       |
| TEC | Advanced Technology  |

### *Related Academic Standards*

|    |   |
|----|---|
| R1 | Interpret Graphic Information (forms, maps, reference sources)                    |
| R2 | Words in Context (same and opposite meaning)                                      |
| R3 | Recall Information (details, sequence)  |
| R4 | Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect) |
| R5 | Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)           |
| M1 | Addition of Whole Numbers (no regrouping, regrouping)                             |
| M2 | Subtraction of Whole Numbers (no regrouping, regrouping)                          |
| M3 | Multiplication of Whole Numbers (no regrouping, regrouping)                       |

## Postsecondary Agricultural Technician Technology

- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability



**SUGGESTED REFERENCES**

## Books

American Association for Vocational Instructional Materials. (2002). *Developing safety skills for the home and shop*. Winterville, GA: Author.

Herren, R. (2009). *Agriculture mechanics: Fundamentals and applications* (6th ed.). Albany, NY: Delmar.

## Computer Software

MAVCC. (2002). *Diesel technology: Introduction*, teacher CD-ROM [Computer software] Stillwater, OK: Author.

## Web Sites

Case/International Harvester. (2011) *Operator manuals/repair manuals/parts catalogs*. Retrieved January 29, 2011, from <http://www.caseih.com>

Deere and Company. (2011). *Technical publications*. Retrieved January 29, 2011, from [http://www.deere.com/en\\_US/ag/servicesupport/serviceliterature/index.html](http://www.deere.com/en_US/ag/servicesupport/serviceliterature/index.html)

Instructional Designs Inc. *Hazard communications*. Retrieved January 29, 2011, from <http://www.free-training.com/osha/hazcom/hazmenu.htm>

Instructional Designs Inc. *Personal protection equipment*. Retrieved January 29, 2011, from <http://www.free-training.com/osha/ppe/Ppemenu.htm>

## Journals

Farm Journal Publications, LLC. *Implement and tractor magazine*. Retrieved January 29, 2011, from [http://www.agweb.com/mymachinery/implement\\_tractor.aspx](http://www.agweb.com/mymachinery/implement_tractor.aspx)

Lessiter Publications. (2011). *Farm equipment*. Retrieved January 29, 2011, from <http://www.lesspub.com/cgi-bin/site.pl?fe/contact>

**Course Name:** Basic Electrical/Electronics Systems

**Course Abbreviation:** AMT 1213

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** A study of electrical/electronic systems and repair as it relates to agricultural power machinery and equipment (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>  |  |
|---|--|
| 1. Explain the physical laws of electricity and magnetism. <sup>(DOK1, SAF, ELT)</sup>              |  |
| a. Identify the physical laws of electricity. <sup>(DOK1)</sup>                                     |  |
| b. Describe the physical laws of magnetism. <sup>(DOK1)</sup>                                       |  |
| 2. Demonstrate procedures for the use of test equipment. <sup>(DOK2, SAF, ELT)</sup>                |  |
| a. Measure voltage. <sup>(DOK2)</sup>   |  |
| b. Measure current. <sup>(DOK2)</sup>   |  |
| c. Measure resistance. <sup>(DOK2)</sup>  |  |
| 3. Demonstrate procedures to maintain and use storage batteries. <sup>(DOK2, SAF, ELT)</sup>        |  |
| a. Describe safety procedures for the storage battery. <sup>(DOK1)</sup>                            |  |
| b. Test the storage battery for voltage and cranking amperage. <sup>(DOK1)</sup>                    |  |
| c. Service the storage battery. <sup>(DOK2)</sup>   |  |
| 4. Demonstrate procedures for use of electrical switches and actuators. <sup>(DOK3, SAF, ELT)</sup> |  |
| a. Design a circuit using electrical switches. <sup>(DOK3)</sup>                                    |  |
| b. Design a circuit using actuators. <sup>(DOK3)</sup>  |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
ELT Electrical Systems

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)

- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

**SUGGESTED REFERENCES**

## Books

Bell, J. (2007). *Modern diesel technology, electricity, and electronics*. Florence, KY: Thompson Delmar.

John Deere Publishing. (2005). *Fundamentals of service: Electronic and electrical systems*. Moline, IL: Author.

## Computer Software

Certified Fluid Power. (2001). *Full motion control training: Electrical* [Computer software]. Provo, UT: Author.

MAVCC. (2006). *Diesel technology: Electrical and electronic systems, teacher CD-ROM* [Computer software]. Stillwater, OK: Author.

**Course Name:** Advanced Electrical/Electronics Systems

**Course Abbreviation:** AMT 1223

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** An advanced study of electrical/electronic systems and repair as it relates to agricultural power machinery and equipment (3 sch: 1-hr lecture, 4-hr lab)

**Prerequisite:** Basic Electrical/Electronics Systems (AMT 1213)

| <b>Competencies and Suggested Objectives</b> |  |
|--|--|
| 1.   | Explain the functions of the components of the cranking and charging systems. (DOK1, SAF, ELT)   |
| a.   | Describe the function of the cranking system including starter, solenoid, and relay. (DOK1)  |
| b.   | Describe the functions of the charging system including alternator, regulator, and indicator gauges. (DOK1)                              |
| 2.   | Demonstrate troubleshooting procedures for the electrical system. (DOK3, SAF, ELT)   |
| a.   | Demonstrate ability to use digital multimeter. (DOK2)  |
| b.   | Use service specifications. (DOK1)   |
| c.   | Read and interpret electrical symbols and schematics. (DOK3)   |
| d.   | Make necessary wire and terminal repairs. (DOK2)   |
| 3.   | Describe the use of microprocessors and other electronic devices in equipment electrical systems. (DOK1, SAF, ELT)                       |
| a.   | Identify primary electronic devices used in controller circuits such as potentiometers, magnetic pickups, and variable resistors. (DOK1) |
| b.   | Describe the basic functions of a controller circuit. (DOK1)   |
| c.   | Describe procedures and tools for diagnosis of electronic controllers and circuits. (DOK1)   |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
ELT Electrical Systems

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)

- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction

- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

Bell, J. (2007). *Modern diesel technology, electricity, and electronics*. Florence, KY: Thompson Delmar.

John Deere Publishing. (2005). *Fundamentals of service: Electronic and electrical systems*. Moline, IL: Author.

### Computer Software

Certified Fluid Power. (2001). *Full motion control training: Electrical* [Computer software.] Provo, UT: Author.

MAVCC. (2006). *Diesel technology: Electrical and electronic systems, teacher CD-ROM* [Computer software]. Stillwater, OK: Author.

**Course Name:** Basic Power Trains

**Course Abbreviation:** AMT 1313

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** A study of machines and the principles upon which they operate in the transmission of power (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b> |   |
|--|---|
| 1.   | Demonstrate machines used for transmitting power in agricultural equipment. (DOK2, SAF, POW)<br>a. Demonstrate mechanical advantage and applications of the lever. (DOK2)<br>b. Demonstrate mechanical advantage and applications of the wheel and axle. (DOK2)<br>c. Demonstrate mechanical advantage and applications of the pulley and belts. (DOK2)<br>d. Demonstrate mechanical advantage and applications of the inclined plane. (DOK2)<br>e. Demonstrate mechanical advantage and applications of the screw. (DOK2)<br>f. Demonstrate mechanical advantage and applications of the wedge. (DOK2) |
| 2.   | Explain the elements of differential and axle assemblies. (DOK1, SAF, POW)<br>a. Identify parts associated with differential systems. (DOK1)<br>b. Identify parts associated with axle systems. (DOK1)  |
| 3.   | Demonstrate methods of power transmission and braking. (DOK2, SAF, POW)<br>a. Demonstrate the transmission of power through direct drive. (DOK2)<br>b. Demonstrate the transmission of power through pulleys and belts. (DOK2)<br>c. Demonstrate the transmission of power through chains and sprockets. (DOK2)<br>d. Demonstrate the transmission of power through gears and shafts. (DOK2)<br>e. Demonstrate the transmission of power through electrically and/or hydraulically controlled systems. (DOK2)   |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
 POW Power Trains

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)



- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
  - A1 Numeration (ordering, place value, scientific notation)
  - A2 Number Theory (ratio, proportion)
  - A3 Data Interpretation (graph, table, chart, diagram)
  - A4 Pre-Algebra and Algebra (equations, inequality)
  - A5 Measurement (money, time, temperature, length, area, volume)
  - A6 Geometry (angles, Pythagorean theory)
  - A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
  - A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability

- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

John Deere Publishing. (2004). *Fundamentals of service: Belts and chains*. Moline, IL: Author.

John Deere Publishing. (2005). *Fundamentals of service: Power trains*. Moline, IL: Author.

### Computer Software

MAVCC. (2004). *Diesel technology: Drive trains, teacher CD-ROM* [Computer software]. Stillwater, OK: Author.

**Course Name:** Advanced Power Trains

**Course Abbreviation:** AMT 1323

**Classification:** Career–Technical Core (Associates Degree)

**Description:** Advanced study of machines and the principles upon which they operate in the transmission of power (3 sch: 1-hr lecture, 4-hr lab)

**Prerequisite:** Basic Power Trains (AMT 1313)

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Disassemble and reassemble clutch packs. (DOK2, SAF, HYD, POW)  |  |
| a. Disassemble a clutch pack. (DOK2)   |  |
| b. Inspect clutch parts for wear and damage. (DOK3)  |  |
| c. Reassemble clutch pack. (DOK2)  |  |
| 2. Repair and replace component parts of a machine including eccentrics, shafts, bearings, fasteners, springs, seals, and “O” rings. (DOK3, SAF, HYD, POW) |  |
| a. Disassemble machines to inspect component parts. (DOK2)   |  |
| b. Inspect component parts of a machine. (DOK3)  |  |
| c. Determine if component parts meet manufacturer’s specifications. (DOK3)   |  |
| d. Reassemble machines according to manufacturer’s specifications. (DOK3)  |  |
| 3. Describe the operation and maintenance of hydrostatic power trains. (DOK3, SAF, HYD, POW)   |  |
| a. Describe basic principles of hydrostatic power transmission. (DOK1)   |  |
| b. Identify benefits of hydrostatic transmission. (DOK1)   |  |
| c. Disassemble, inspect, and reassemble a hydrostatic transmission. (DOK3)   |  |
| d. Diagnose power train components and systems. (DOK3)   |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

HYD   Hydraulics  
 POW   Power Trains

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)

## Postsecondary Agricultural Technician Technology

- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability

CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

John Deere Publishing. (2004). *Fundamentals of service: Belts and chains*. Moline, IL: Author.

John Deere Publishing. (2005). *Fundamentals of service: Power trains*. Moline, IL: Author.

### Computer Software

MAVCC. (2004). *Diesel technology: Drive trains, teacher CD-ROM* [CD ROM software]. Stillwater, OK: Author.

**Course Name:** Basic Engines

**Course Abbreviation:** AMT 1413

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** A study of the theory of operation disassembly/assembly, parts identification, service, and repair of gasoline engines used in compact equipment (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Explain the theory of operation of an internal combustion engine. (DOK1, SAF, EFS)      |  |
| a. Describe events that occur in each cycle of the four-stroke cycle engine. (DOK1)        |  |
| b. Describe the elements necessary for the operation of a four-stroke cycle engine. (DOK1) |  |
| 2. Explain the compression ratio. (DOK2, SAF, EFS)   |  |
| a. Identify the formula used to calculate a compression ratio. (DOK1)                      |  |
| b. Calculate the compression ratio. (DOK2)   |  |
| 3. Service the fuel system in internal combustion engines. (DOK1, SAF, EFS)                |  |
| a. Identify the components of the fuel system. (DOK1)                                      |  |
| b. Service a gasoline fuel system. (DOK1)  |  |
| 4. Compare the ignition systems found in gasoline engines. (DOK1, SAF, EFS)                |  |
| a. Describe how the spark ignition system functions. (DOK1)                                |  |
| 5. Explain the function of the lubrication system. (DOK1, SAF, EFS)                        |  |
| a. Identify the components of the lubrication system. (DOK1)                               |  |
| b. Describe the function of the components of the lubrication system. (DOK1)               |  |
| c. Identify types of lubricants. (DOK1)  |  |
| 6. Explain the function of the cooling system. (DOK1, SAF, EFS)                            |  |
| a. Identify the components of the cooling system. (DOK1)                                   |  |
| b. Describe the function of the components of the cooling system. (DOK1)                   |  |
| c. Identify types of coolants. (DOK1)  |  |
| 7. Explain the function of the air intake system. (DOK1, SAF, EFS)                         |  |
| a. Identify the components of the air intake system. (DOK1)                                |  |
| b. Describe the function of the components of the air intake system. (DOK1)                |  |
| c. Identify types of filters. (DOK1)   |  |
| 8. Explain the function of the exhaust system. (DOK1, SAF, EFS)                            |  |
| a. Identify the components of the exhaust system. (DOK1)                                   |  |
| b. Describe the function of the components of the exhaust system. (DOK1)                   |  |
| 9. Disassemble, analyze components, and assemble an engine. (DOK3, SAF, EFS)               |  |
| a. Disassemble a gasoline engine. (DOK1)   |  |
| b. Identify engine parts. (DOK1)   |  |
| c. Analyze cause of engine failure. (DOK3)   |  |
| d. Inspect parts and determine wear or damage using precision measuring tools. (DOK3)      |  |
| e. Reassemble according to manufacturer's specifications. (DOK3)                           |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

- SAF Safety  
EFS Engines and Fuel Systems

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)  
R2 Words in Context (same and opposite meaning)  
R3 Recall Information (details, sequence)  
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)  
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)  
M1 Addition of Whole Numbers (no regrouping, regrouping)  
M2 Subtraction of Whole Numbers (no regrouping, regrouping)  
M3 Multiplication of Whole Numbers (no regrouping, regrouping)  
M4 Division of Whole Numbers (no remainder, remainder)  
M5 Decimals (addition, subtraction, multiplication, division)  
M6 Fractions (addition, subtraction, multiplication, division)  
M7 Integers (addition, subtraction, multiplication, division)  
M8 Percents  
M9 Algebraic Operations  
A1 Numeration (ordering, place value, scientific notation)  
A2 Number Theory (ratio, proportion)  
A3 Data Interpretation (graph, table, chart, diagram)  
A4 Pre-Algebra and Algebra (equations, inequality)  
A5 Measurement (money, time, temperature, length, area, volume)  
A6 Geometry (angles, Pythagorean theory)  
A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)  
A8 Estimation (rounding, estimation)  
L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)  
L2 Sentence Formation (fragments, run-on, clarity)  
L3 Paragraph Development (topic sentence, supporting sentence, sequence)  
L4 Capitalization (proper noun, titles)  
L5 Punctuation (comma, semicolon)  
L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)  
S1 Vowel (short, long)  
S2 Consonant (variant spelling, silent letter)  
S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

## 21st Century Skills

---

### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

---

## SUGGESTED REFERENCES

---

### Books

John Deere Publishing. (2004). *Compact equipment: Engines*. Moline, IL: Author.

John Deere Publishing. (2008). *Fuels, lubricants, and coolants*. Moline, IL: Author.

John Deere Publishing. (2006). *Identification of parts failure*. Moline, IL: Author.

### Computer Software

MAVCC. (2002). Diesel technology: Engines, teacher CD-ROM [Computer software]. Stillwater, OK: Author.



**Course Name:** Advanced Engines

**Course Abbreviation:** AMT 1423

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** A study of the theory of operation disassembly/assembly, parts identification, service, and repair of diesel engines (3 sch: 1-hr lecture, 4-hr lab)

**Prerequisite:** Basic Engines (AMT 1413)

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Service the fuel system in internal combustion engines. (DOK2, SAF, EFS)            |  |
| a. Identify the components of the diesel fuel system. (DOK1)                           |  |
| b. Service a diesel fuel system. (DOK2)  |  |
| c. Describe how the compression ignition system functions. (DOK1)                      |  |
| 2. Explain the function of the lubrication system. (DOK1, SAF, EFS)                    |  |
| a. Identify the components of the lubrication system. (DOK1)                           |  |
| b. Describe the function of the components of the lubrication system. (DOK1)           |  |
| c. Identify types of lubricants. (DOK1)  |  |
| 3. Explain the function of the cooling system. (DOK1, SAF, EFS)                        |  |
| a. Identify the components of the cooling system. (DOK1)                               |  |
| b. Describe the function of the components of the cooling system. (DOK1)               |  |
| 4. Explain the function of the air intake system. (DOK1, SAF, EFS)                     |  |
| a. Identify the components of the air intake system. (DOK1)                            |  |
| b. Describe the function of the components of the air intake system. (DOK1)            |  |
| c. Identify types of filters. (DOK1)   |  |
| 5. Explain the function of the exhaust system. (DOK1, SAF, EFS)                        |  |
| a. Identify the components of the exhaust system. (DOK1)                               |  |
| b. Describe the function of the components of the exhaust system. (DOK1)               |  |
| c. Describe the function of a turbo charger. (DOK1)                                    |  |
| 6. Disassemble, analyze components, and assemble an engine. (DOK3, SAF, EFS)           |  |
| a. Disassemble a diesel engine. (DOK2)   |  |
| b. Identify engine parts. (DOK1)   |  |
| c. Analyze cause of engine failure. (DOK3)   |  |
| d. Inspect parts, and determine wear or damage using precision measuring tools. (DOK3) |  |
| e. Reassemble according to manufacturer's specifications. (DOK3)                       |  |

## STANDARDS

*Standards for Agricultural Mechanics Technology*

SAF Safety  
EFS Engines and Fuel Systems

---

*Related Academic Standards*


---

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

*21st Century Skills*


---

CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation

CS7 Critical Thinking and Problem Solving

CS8 Communication and Collaboration

CSS3-Information, Media and Technology Skills

CS9 Information Literacy

CS10 Media Literacy

CS11 ICT Literacy

CSS4-Life and Career Skills

CS12 Flexibility and Adaptability

CS13 Initiative and Self-Direction

CS14 Social and Cross-Cultural Skills

CS15 Productivity and Accountability

CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

Barberi, D., Miller, R., & Kellum, M. (1998). *Diesel technology: Engines*. Stillwater, OK: MAVCC.

John Deere Publishing. (2008). *Fuels, lubricants, and coolants*. Moline, IL: Author.

John Deere Publishing. (2004). *Fundamentals of service: Engines*. Moline, IL: Author.

John Deere Publishing. (2006). *Identification of parts failure*. Moline, IL: Author.

### Computer Software

MAVCC. (2002). *Diesel technology: Engines, teacher CD-ROM* [Computer software]. Stillwater, OK: Author.

MAVCC. (2006). *Diesel technology: Preventive maintenance, teacher CD-ROM* [Computer software]. Stillwater, OK: Author.

**Course Name:** Principles of Air Conditioning

**Course Abbreviation:** AMT 1511

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** Principles and service of air conditioning systems used on agricultural equipment (1 sch: 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Describe the principles of refrigeration. <sup>(DOK1, SAF, HVA)</sup>   |  |
| a. Describe the properties of refrigerant. <sup>(DOK1)</sup>   |  |
| b. Describe an evaporator, a condenser, a compressor, an expansion valve, and a thermostat. <sup>(DOK1)</sup>  |  |
| c. Describe the requirements for environmentally approved refrigerants allowed under federal and state regulations, including licensing. <sup>(DOK1)</sup> |  |
| 2. Perform preventative maintenance on air conditioning systems. <sup>(DOK2, SAF, HVA)</sup>   |  |
| a. Clean an air conditioning system. <sup>(DOK2)</sup>   |  |
| b. Visually inspect components of an air conditioning system. <sup>(DOK3)</sup>  |  |
| c. Perform leak detection on an air conditioning system. <sup>(DOK2)</sup>   |  |
| d. Check refrigerant level. <sup>(DOK2)</sup>  |  |
| 3. Service an air conditioning system. <sup>(DOK2, SAF, ELT, HVA)</sup>  |  |
| a. Diagnose electrical components and systems that are related to the AC system. <sup>(DOK3)</sup>   |  |
| b. Recover refrigerant. <sup>(DOK2)</sup>  |  |
| c. Inspect component parts. <sup>(DOK3)</sup>  |  |
| d. Evacuate the air conditioning system. <sup>(DOK2)</sup>   |  |
| e. Recharge the air conditioning system. <sup>(DOK2)</sup>   |  |
| f. Recheck for leaks. <sup>(DOK2)</sup>  |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety

ELT Electrical Systems

HVA Mobile Heating, Ventilation, and Air Conditioning (HVAC) Systems

### *Related Academic Standards*

R1 Interpret Graphic Information (forms, maps, reference sources)

R2 Words in Context (same and opposite meaning)

R3 Recall Information (details, sequence)

R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)

- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

John Deere Publishing. (2009). *Fundamentals of service: Air conditioning*. Moline, IL: Author.

### Videos

Thomson Delmar Learning. (2000). *How to diagnose automotive air conditioning problems* [DVD-ROM]. Florence, KY: Author.

Thomson Delmar Learning. (2007). *Understanding automotive air conditioning* [DVD-ROM]. Florence, KY: Author.

**Course Name:** Basic Hydraulic Systems

**Course Abbreviation:** AMT 1613

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** Basic theory and application of hydraulic systems in agricultural machinery and equipment (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Explain the physical laws of hydraulics. (DOK1, SAF, HYD)                         |  |
| a. Define kinetic energy. (DOK1)   |  |
| b. Define potential energy. (DOK1)   |  |
| 2. Identify types of hydraulic pumps. (DOK1, SAF, HYD)                               |  |
| a. Identify a constant displacement pump. (DOK1)                                     |  |
| b. Identify a variable displacement pump. (DOK1)                                     |  |
| 3. Identify and describe the functions of hydraulic control valves. (DOK1, SAF, HYD) |  |
| a. Identify the types of hydraulic valves. (DOK1)                                    |  |
| b. Describe the functions of hydraulic valves. (DOK1)                                |  |
| 4. Identify and describe the functions of hydraulic actuators. (DOK1, SAF, HYD)      |  |
| a. Identify types of hydraulic actuators. (DOK1)                                     |  |
| b. Describe the functions of hydraulic actuators. (DOK1)                             |  |
| 5. Explain the functions of hydraulic systems. (DOK1, SAF, HYD)                      |  |
| a. Describe the function of an open center hydraulic system. (DOK1)                  |  |
| b. Describe the function of a closed center hydraulic system. (DOK1)                 |  |
| c. Read and interpret hydraulic schematics. (DOK2)                                   |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
HYD Hydraulics

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)

- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills



- CS15 Productivity and Accountability  
CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

- John Deere Publishing. (2006). *Fundamentals of service: Hydraulics*. Moline, IL: Author.
- MAVCC. (1994). *Hydraulics, teacher edition*. Stillwater, OK: Author.

### Computer Software

- Certified Fluid Power. (2001). *Full motion control training: Hydraulics* [Computer software.] Provo, UT: Author.

**Course Name:** Grain Harvesting Equipment

**Course Abbreviation:** AMT 211(1-3)

**Classification:** Career–Technical Elective

**Description:** Procedures for the inspection, adjustment, repair, and lubrication of grain harvesting equipment (1 sch: 2-hr lab; 2 sch: 1-hr lecture, 2-hr lab; 3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Identify safety procedures used on grain harvesting equipment. (DOK1, SAF, HAR)                                 |  |
| a. Identify safety procedures for using lifting and support equipment. (DOK1)                                      |  |
| b. Identify safety procedures for servicing moving parts. (DOK1)   |  |
| 2. Service a combine header. (DOK2, SAF, HAR)  |  |
| a. Check the sickle blades and repair or replace. (DOK2)   |  |
| b. Check the auger fingers and repair or replace. (DOK2)   |  |
| c. Check and adjust reel height. (DOK2)  |  |
| d. Check and adjust all related gears, chains, and bearings. (DOK2)  |  |
| 3. Service the combine cylinder and concave. (DOK2, SAF, HAR)  |  |
| a. Check the bearing and repair or replace. (DOK2)   |  |
| b. Check the spike teeth or rasp bars, and repair or replace. (DOK2)   |  |
| c. Adjust cylinder to concave. (DOK2)  |  |
| d. Set cylinder rpm. (DOK1)  |  |
| 4. Service combine separators. (DOK2, SAF, HAR)  |  |
| a. Inspect and adjust cleaning shoe and sieves. (DOK2)   |  |
| b. Inspect and adjust cleaning fan. (DOK2)   |  |
| c. Inspect and adjust clean grain and tailing elevator. (DOK2)   |  |
| 5. Service hydraulic system, final drives, and engines as specified by the manufacturer. (DOK2, SAF, HAR)          |  |
| a. Inspect, check fluid levels, and change filter on hydraulic systems. (DOK2)                                     |  |
| b. Inspect and check fluid levels on final drives. (DOK2)  |  |
| c. Inspect, check fluid levels, and change filter and oil on engine. (DOK2)  |  |
| 6. Service combine fan system. (DOK2, SAF, HAR)  |  |
| a. Inspect fan for worn blades, bearings, and belts and replace as needed. (DOK3)                                  |  |
| b. Adjust fan speed to specifications. (DOK2)  |  |
| 7. Lubricate combine. (DOK1, SAF, HAR)   |  |
| a. Read and interpret manufacturer's service manual for maintenance schedule and locations for lubrication. (DOK1) |  |
| b. Consult manufacturer's service manual for types of oils and lubricants for use on combines. (DOK1)              |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
 HAR Harvesting Systems

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

## 21st Century Skills

---

### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

---

## SUGGESTED REFERENCES

---

### Books

John Deere Publishing. (2007). *Fundamentals of machine operation: Combine*. Moline, IL: Author.

**Course Name:** Cotton Harvesting Equipment

**Course Abbreviation:** AMT 231(1-3)

**Classification:** Career–Technical Elective

**Description:** Functions, maintenance, and repair of cotton picker drums and support systems (1 sch: 2-hr lab; 2 sch: 1-hr lecture, 2-hr lab; 3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Identify safety procedures used on cotton harvesting equipment. (DOK1, SAF, HAR)                        |  |
| a. Identify safety procedures for using lifting and support equipment. (DOK1)                              |  |
| b. Identify safety procedures for servicing moving parts. (DOK1)   |  |
| c. Inspect and adjust all shields, safety devices, and guards found on cotton harvesting equipment. (DOK2) |  |
| 2. Set up and adjust cotton harvesting equipment for field operation. (DOK2, SAF, HAR)                     |  |
| a. Identify functions of the components of cotton harvesting equipment. (DOK1)                             |  |
| b. Describe the flow of cotton from the header to the basket. (DOK1)                                       |  |
| c. Set up cotton picker for field operation. (DOK3)  |  |
| d. Adjust cotton picker for field operation according to manufacturer's specifications. (DOK3)             |  |
| 3. Repair and lubricate cotton harvesting equipment. (DOK2, SAF, HAR)                                      |  |
| a. Inspect cotton harvesting equipment for wear or damage. (DOK3)  |  |
| b. Repair and lubricate cotton harvesting equipment according to manufacturer's specifications. (DOK3)     |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
HAR Harvesting Systems

### *Related Academic Standards*

R1 Interpret Graphic Information (forms, maps, reference sources)  
R2 Words in Context (same and opposite meaning)  
R3 Recall Information (details, sequence)  
R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)  
R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)  
M1 Addition of Whole Numbers (no regrouping, regrouping)  
M2 Subtraction of Whole Numbers (no regrouping, regrouping)  
M3 Multiplication of Whole Numbers (no regrouping, regrouping)

- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability

CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Web Sites

Case International. (2011). *Cotton express cotton pickers*. Retrieved January 29, 2011, from <http://www.caseih.com/northamerica/Products/Harvesting/Pages/harvesting-equipment.aspx>

John Deere and Company. (2011). *Cotton harvesting equipment*. Retrieved January 29, 2011, from [http://www.deere.com/en\\_US/ProductCatalog/FR/category/FR\\_CHARVESTING.html](http://www.deere.com/en_US/ProductCatalog/FR/category/FR_CHARVESTING.html)

**Course Name:** Hay Harvesting Equipment

**Course Abbreviation:** AMT 241(1-3)

**Classification:** Career–Technical Elective

**Description:** Procedures for inspection, adjustment, repair, and lubrication of hay harvesting equipment (1 sch: 2-hr lab; 2 sch: 1-hr lecture, 2-hr lab; 3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>  |  |
|---|--|
| 1. Identify safety procedures used on hay harvesting equipment. (DOK1, SAF, HAR)                        |  |
| a. Identify safety procedures for using, lifting, and supporting equipment. (DOK1)                      |  |
| b. Identify safety procedures for servicing moving parts. (DOK1)  |  |
| c. Inspect and adjust all shields, safety devices, and guards found on hay harvesting equipment. (DOK2) |  |
| 2. Identify and describe different types of equipment used in hay harvesting. (DOK1, SAF, HAR)          |  |
| a. Identify and describe the different types of mowers used in hay harvesting. (DOK1)                   |  |
| b. Identify and describe the different types of rakes used in hay harvesting. (DOK1)                    |  |
| c. Identify and describe the different types of balers used in hay harvesting. (DOK1)                   |  |
| 3. Set up and adjust hay equipment for field operation. (DOK2, SAF, HAR)                                |  |
| a. Attach hay equipment for field operation. (DOK2)   |  |
| b. Set up for field operation. (DOK2)   |  |
| c. Adjust for field operation according to manufacturer's specifications. (DOK2)                        |  |
| 4. Inspect, service and repair hay equipment. (DOK3, SAF, HAR)  |  |
| a. Inspect hay equipment for wear or damage. (DOK3)   |  |
| b. Service and repair hay equipment according to manufacturer's specifications. (DOK2)                  |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety

HAR Harvesting Systems

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)



- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills

- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

John Deere Publishing. (2004). *Fundamentals of machinery operation: Hay and forage harvesting*. Moline, IL: Author.

John Deere Publishing. (1993). *Fundamentals of machinery operation: Mowers and sprayers*. Moline, IL: Author.

**Course Name:** Spray Equipment

**Course Abbreviation:** AMT 2513

**Classification:** Career–Technical Elective

**Description:** Selection, assembly, inspection, adjustment, calibration, and repair of spray equipment including safety procedures and environmental concerns (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>  |  |
|---|--|
| 1. Identify safety procedures used on spray equipment. (DOK1, SAF, TSC)                   |  |
| a. Identify safety procedures for using lifting and support equipment. (DOK1)             |  |
| b. Identify safety procedures for servicing moving parts. (DOK1)                          |  |
| c. Identify MSDS functions and sheet symbols. (DOK1)                                      |  |
| 2. Service mechanical components of a sprayer. (DOK1, SAF, TSC)                           |  |
| a. Identify mechanical components of a sprayer. (DOK1)                                    |  |
| b. Disassemble and assemble a pressure manifold. (DOK2)                                   |  |
| c. Disassemble and assemble a pump. (DOK2)  |  |
| d. Disassemble and assemble a valve. (DOK2)   |  |
| e. Disassemble and assemble a spray body. (DOK2)  |  |
| 3. Explain procedures to calibrate a sprayer. (DOK1, SAF, TSC)                            |  |
| a. Identify methods of calibration including distance method and time method. (DOK1)      |  |
| b. Calculate quantity of spray material to be applied. (DOK2)                             |  |
| c. Select spray nozzles for various applications and environmental considerations. (DOK2) |  |
| d. Calibrate a sprayer for a given application rate. (DOK2)                               |  |
| e. Describe principles of operation of a variable rate spray applicator. (DOK1)           |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety

TSC Tillage, Seeding, and Chemical Application Systems

### *Related Academic Standards*

R1 Interpret Graphic Information (forms, maps, reference sources)

R2 Words in Context (same and opposite meaning)

R3 Recall Information (details, sequence)

R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)

R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)

M1 Addition of Whole Numbers (no regrouping, regrouping)

M2 Subtraction of Whole Numbers (no regrouping, regrouping)

- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills

- CS15 Productivity and Accountability  
CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

Brase, T. (2006). *Precision agriculture*. Clifton Park, NY: Delmar.

John Deere Publishing. (1993). *Fundamentals of machinery operation: Mowers and sprayers*. Moline, IL: Author.

John Deere Publishing. (2010). *The precision-farming guide for agriculturists*. Moline, IL: Author.

**Course Name:** Advanced Hydraulic Systems

**Course Abbreviation:** AMT 2623

**Classification:** Career–Technical Core (Associates Degree)

**Description:** Advanced theory and application of hydraulic systems in agricultural machinery and equipment (3 sch: 1-hr lecture, 4-hr lab)

**Prerequisite:** Basic Hydraulic Systems (AMT 1613)

| <b>Competencies and Suggested Objectives</b>   |  |
|--|--|
| 1. Perform service and tests on hydraulic systems. (DOK2, SAF, HYD)                    |  |
| a. Pressure test an open center hydraulic system. (DOK2)                               |  |
| b. Flow test an open center hydraulic system. (DOK2)                                   |  |
| c. Service an open center hydraulic system. (DOK2)                                     |  |
| d. Pressure test a closed center hydraulic system. (DOK2)                              |  |
| e. Flow test a closed center hydraulic system. (DOK2)                                  |  |
| f. Service a closed center hydraulic system. (DOK2)                                    |  |
| 2. Disassemble, inspect, repair, and reassemble radial piston pumps. (DOK3, SAF, HYD)  |  |
| a. Identify components of radial piston pumps. (DOK1)                                  |  |
| b. Inspect components of radial piston pumps for wear and damage. (DOK3)               |  |
| c. Reassemble radial piston pumps according to manufacturer's specifications. (DOK2)   |  |
| 3. Disassemble, inspect, repair, and reassemble axial piston pumps. (DOK3, SAF, HYD)   |  |
| a. Identify components of axial piston pumps. (DOK1)                                   |  |
| b. Inspect axial piston pump components for wear and damage. (DOK3)                    |  |
| c. Reassemble axial piston pumps according to manufacturer's specifications. (DOK2)    |  |
| 4. Identify, inspect, and service hydraulic control valve assemblies. (DOK3, SAF, HYD) |  |
| a. Describe types and functions of hydraulic control valve assemblies. (DOK1)          |  |
| b. Disassemble, inspect, and reassemble hydraulic control valves. (DOK3)               |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
HYD Hydraulics

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)

- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
  - A1 Numeration (ordering, place value, scientific notation)
  - A2 Number Theory (ratio, proportion)
  - A3 Data Interpretation (graph, table, chart, diagram)
  - A4 Pre-Algebra and Algebra (equations, inequality)
  - A5 Measurement (money, time, temperature, length, area, volume)
  - A6 Geometry (angles, Pythagorean theory)
  - A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
  - A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability

- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

John Deere Publishing. (2006). *Fundamentals of service: Hydraulics*. Moline, IL: Author.

John Deere Publishing. (2009). *Fundamentals of service: Hydraulic systems diagnostics*. Moline, IL: Author.

MAVCC. (1994). *Hydraulics, teacher edition*. Stillwater, OK: Author.

### Computer Software

Certified Fluid Power. (2001). *Full motion control training: Hydraulics* [Computer software.] Provo, UT: Author.



**Course Name:** Row Crop Planting Systems

**Course Abbreviation:** AMT 2712

**Classification:** Career–Technical Core (Associate Degree); Career–Technical Elective (Certificate)

**Description:** Setup, inspection, adjustment, and service of row crop planting equipment including an introduction to variable rate application equipment (2 sch: 1-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>  |  |
|---|--|
| 1. Demonstrate procedures to set up row crop planting equipment. (DOK1, SAF, TSC)                                   |  |
| a. Identify drive components on row crop planters. (DOK1)   |  |
| b. Identify covering components on row crop planters. (DOK1)  |  |
| c. Identify the metering devices on row crop planters. (DOK1)   |  |
| d. Set up planters for row width and crop. (DOK2)   |  |
| e. Describe use of no-till planting equipment. (DOK1)   |  |
| f. Set up no-till planting equipment. (DOK2)  |  |
| 2. Demonstrate procedures to adjust row crop planting equipment. (DOK2, SAF, TSC)                                   |  |
| a. Identify adjustments on row crop planters. (DOK1)  |  |
| b. Describe adjustment of the metering devices on row crop planters. (DOK1)   |  |
| c. Perform adjustments on row crop planters. (DOK2)   |  |
| d. Calibrate fertilizer application equipment. (DOK2)   |  |
| 3. Demonstrate procedures to service row crop planting equipment. (DOK2, SAF, TSC)                                  |  |
| a. Identify service to perform on row crop planters. (DOK1)   |  |
| b. Describe service of the metering devices on row crop planters. (DOK1)  |  |
| c. Perform service on row crop planters. (DOK2)   |  |
| 4. Describe and discuss the principles of precision agriculture technology. (DOK1, SAF, TSC)                        |  |
| a. Identify the components of a precision agriculture program. (DOK1)   |  |
| b. Discuss factors to be considered in establishing a variable rate prescription for a given crop and field. (DOK1) |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety

TSC Tillage, Seeding, and Chemical Application Systems

### *Related Academic Standards*

R1 Interpret Graphic Information (forms, maps, reference sources)

R2 Words in Context (same and opposite meaning)

## Postsecondary Agricultural Technician Technology

- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy

- CS11 ICT Literacy
- CSS4-Life and Career Skills
  - CS12 Flexibility and Adaptability
  - CS13 Initiative and Self-Direction
  - CS14 Social and Cross-Cultural Skills
  - CS15 Productivity and Accountability
  - CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

Brase, T. (2006). *Precision agriculture*. Clifton Park, NY: Delmar.

John Deere Publishing. (2010). *The precision-farming guide for agriculturists*. Moline, IL: Author.

John Deere Publishing. (1998). *Fundamentals of service: Planting*. Moline, IL: Author.

### Web Sites

Case/IH. (2011). *Planting and seeding equipment*. Retrieved January 29, 2011, from <http://www.caseih.com/northamerica/Products/PlantingSeeding/Pages/planting-seeding-equipment.aspx>

Deere and Company. (2011). *Seed equipment and planting equipment from John Deere*. Retrieved January 29, 2011, from [http://www.deere.com/en\\_US/ProductCatalog/FR/category/FR\\_PSED.html](http://www.deere.com/en_US/ProductCatalog/FR/category/FR_PSED.html)

**Course Name:** Compact Engines and Equipment

**Course Abbreviation:** AMT 2813

**Classification:** Career–Technical Core (Certificate and Associates Degree)

**Description:** Inspection, service, and repair of compact equipment (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>                                      |                  |
|---|------------------|
| 1. Identify safety procedures used on compact equipment.                          | (DOK1, SAF, EFS) |
| a. Identify safety procedures for using lifting and supporting compact equipment. | (DOK1)           |
| b. Identify safety procedures for servicing moving parts.                         | (DOK1)           |
| c. Inspect and adjust all shields, safety devices, and guards.                    | (DOK1)           |
| 2. Inspect, troubleshoot, and service compact equipment.                          | (DOK3, SAF, EFS) |
| a. Perform periodic maintenance on compact equipment.                             | (DOK1)           |
| b. Troubleshoot, inspect, and repair compact equipment.                           | (DOK3)           |
| 3. Troubleshoot and repair major component parts of compact equipment.            | (DOK3, SAF, EFS) |
| a. Inspect, troubleshoot, and repair/adjust pumps on compact equipment.           | (DOK3)           |
| b. Inspect, troubleshoot, and repair/adjust gear boxes on compact equipment.      | (DOK3)           |
| c. Inspect, troubleshoot, and repair/adjust mower decks.                          | (DOK3)           |
| d. Inspect, troubleshoot, and repair/adjust PTO and belt drives.                  | (DOK3)           |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF     Safety  
EFS     Engines and Fuel Systems

### *Related Academic Standards*

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)

- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy
- CS11 ICT Literacy

#### CSS4-Life and Career Skills

- CS12 Flexibility and Adaptability
- CS13 Initiative and Self-Direction
- CS14 Social and Cross-Cultural Skills
- CS15 Productivity and Accountability
- CS16 Leadership and Responsibility

**SUGGESTED REFERENCES**

## Books

John Deere Publishing. (2004). *Compact equipment: Engines*. Moline, IL: Author.

John Deere Publishing. (2005). *Compact equipment: Power trains*. Moline, IL: Author.

MAVCC. (1999). *Power product: Equipment systems*. Stillwater, OK: Author.

MAVCC. (1999). *Power product: Lawn and garden equipment*. Stillwater, OK: Author.

MAVCC. (1996). *Power product: Engine systems and service*. Stillwater, OK: Author.

## Computer Software

MAVCC. (2002). *Diesel technology: Engines, teacher CD-ROM [Computer software]*. Stillwater, OK: Author.

**Course Name:** Service Repair Center Management and Operations

**Course Abbreviation:** AMT 2823

**Classification:** Career–Technical Elective

**Description:** Management and daily operations of an agricultural equipment service center including record-keeping, reference materials, tool and equipment maintenance, and service scheduling (3 sch: 2-hr lecture, 2-hr lab)

**Prerequisite:** None

| <b>Competencies and Suggested Objectives</b>  |  |
|---|--|
| 1. Maintain manual and computerized records. (DOK1, SAF, SER, TEC)  |  |
| a. Utilize repair orders. (DOK1)  |  |
| b. Record time sheets. (DOK1)   |  |
| c. Prepare parts tickets. (DOK1)  |  |
| 2. Manage shop tools, equipment, and facilities. (DOK2, SAF, SER, TEC)  |  |
| a. Demonstrate inventory of special tools using manual and computerized record systems. (DOK2)                      |  |
| b. Demonstrate maintenance and storage procedures for tools and equipment. (DOK2)                                   |  |
| 3. Maintain reference library, including technical media and computerized systems. (DOK1, SAF, SER, TEC)            |  |
| a. Demonstrate inventory of reference library. (DOK1)   |  |
| b. Demonstrate procedures for keeping publications current. (DOK1)  |  |
| c. Demonstrate ability to locate information in the reference library using manual and computerized systems. (DOK1) |  |
| 4. Schedule service using manual and computerized systems. (DOK1, SAF, SER, TEC)                                    |  |
| a. Demonstrate ability to prepare a service order. (DOK1)   |  |
| b. Demonstrate ability to identify services required. (DOK1)  |  |
| c. Plan repair jobs according to the time schedule published by the manufacturer. (DOK1)                            |  |

## STANDARDS

### *Standards for Agricultural Mechanics Technology*

SAF Safety  
 SER Service Department Policies and Procedures  
 TEC Advanced Technology

### *Related Academic Standards*

R1 Interpret Graphic Information (forms, maps, reference sources)  
 R2 Words in Context (same and opposite meaning)  
 R3 Recall Information (details, sequence)

## Postsecondary Agricultural Technician Technology

- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)
- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations
- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)
- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)
- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

Copyright © 2005 by CTB/McGraw-Hill LLC

---

### *21st Century Skills*

---

#### CSS1-21st Century Themes

- CS1 Global Awareness
- CS2 Financial, Economic, Business, and Entrepreneurial Literacy
- CS3 Civic Literacy
- CS4 Health Literacy
- CS5 Environmental Literacy

#### CSS2-Learning and Innovation Skills

- CS6 Creativity and Innovation
- CS7 Critical Thinking and Problem Solving
- CS8 Communication and Collaboration

#### CSS3-Information, Media and Technology Skills

- CS9 Information Literacy
- CS10 Media Literacy



- CS11 ICT Literacy
- CSS4-Life and Career Skills
  - CS12 Flexibility and Adaptability
  - CS13 Initiative and Self-Direction
  - CS14 Social and Cross-Cultural Skills
  - CS15 Productivity and Accountability
  - CS16 Leadership and Responsibility

## SUGGESTED REFERENCES

### Books

- American Association for Vocational Instructional Materials. (2002). *Developing safety skills for the home and shop*. Winterville, GA: Author.
- Herren, R. (2006). *Agriculture mechanics: Fundamentals and applications* (5th ed.). Albany, NY: Delmar.
- Schneider, M. (2004). *Automotive service management, the high performance shop*. Florence, KY: Thompson Delmar.

### Computer Software

- AERA Engine Rebuilder's Association. (2006). Pro-Sis [Computer software]. Buffalo Grove, IL: Author.

**Course Name:** Special Problem in Agricultural Mechanics Technology

**Course Abbreviation:** AMT 291(1-3)

**Classification:** Career–Technical Elective

**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. (1-3 sch: 2-6-hr lab)

**Prerequisite:** Sophomore standing in Agricultural Mechanics Technology and/or consent of the instructor

| <b>Competencies and Suggested Objectives</b> |  |
|--|--|
| 1.   | Develop a written plan that details the activities and projects to be completed. <ol style="list-style-type: none"> <li>a. Use a written plan that details the activities and projects to be completed.</li> <li>b. Perform written occupational objectives in the special problem.</li> </ol> |
| 2.   | Assess accomplishment of objectives. <ol style="list-style-type: none"> <li>a. Prepare daily written assessments of accomplishment of objectives.</li> <li>b. Present weekly written reports to the instructor of activities performed and objectives accomplished.</li> </ol>                 |
| 3.   | Use and follow a set of written guidelines for the special problem. <ol style="list-style-type: none"> <li>a. Develop and follow a set of written guidelines for the special problem.</li> </ol>   |

## STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

## SUGGESTED REFERENCES

Specific references for use in this course will depend upon the nature of the problem under investigation.

**Course Name:** Supervised Work Experience in Agricultural Technician Technology

**Course Abbreviation:** AMT 292(1-6)

**Classification:** Career–Technical Elective

**Description:** A course that is a cooperative program between industry and education and is 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. (1-6 sch: 3-18-hr externship)

**Prerequisite:** Consent of instructor

| <b>Competencies and Suggested Objectives</b>  |
|---|
| 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. <ol style="list-style-type: none"> <li>a. Prepare a description of skills to be developed in the supervised work experience program.</li> <li>b. Practice skills needed to be a viable member of the workforce.</li> </ol>                               |
| 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. <ol style="list-style-type: none"> <li>a. Prepare daily written assessments of work performance as specified in the occupational objectives.</li> <li>b. Present weekly written reports to the instructor of activities performed and objectives accomplished.</li> </ol> |

## STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

## SUGGESTED REFERENCES

Specific references for use in this course will depend upon the nature of the problem under investigation.

**Course Name:** Work-Based Learning I, II, III, IV, V, and VI

**Course Abbreviation:** WBL 191(1-3), WBL 192(1-3), WBL 193(1-3), WBL 291(1-3), WBL 292(1-3), and WBL 293(1-3)

**Classification:** Free Elective

**Description:** A structured work-site learning experience in which the student, program area teacher, Work-Based Learning Coordinator, and work-site supervisor/mentor develop and implement an educational training agreement. Designed to integrate the student's academic and technical skills into a work environment. May include regular meetings and seminars with school personnel and employers for supplemental instruction and progress reviews (1-3 sch: 3-9-hr externship)

**Prerequisite:** Concurrent enrollment in Career–Technical program area courses

| <b>Competencies and Suggested Objectives</b> |  |
|--|--|
| 1.   | Apply technical skills and related academic knowledge needed to be a viable member of the workforce. <ol style="list-style-type: none"> <li>a. Demonstrate technical skills necessary to complete job requirements.</li> <li>b. Demonstrate academic skills necessary to complete job requirements.</li> <li>c. Perform tasks detailed in an educational training agreement at the work setting.</li> </ol>  |
| 2.   | Apply general workplace skills to include positive work habits necessary for successful employment. <ol style="list-style-type: none"> <li>a. Demonstrate appropriate human relationship skills in the work setting to include conflict resolution, team participation, leadership, negotiation, and customer/client service.</li> <li>b. Utilize time, materials, and resource management skills.</li> <li>c. Use critical-thinking skills such as problem solving, decision making, and reasoning.</li> <li>d. Acquire, evaluate, organize, maintain, interpret, and communicate information.</li> </ol> |

## STANDARDS

Specific standards for this course will depend upon the nature of the problem under investigation.

## SUGGESTED REFERENCES

Specific references for this course will depend upon the nature of the problem under investigation.

## Recommended Tools and Equipment

(Quantities for a class up to 15 students)

### 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:

\* Additional equipment may be needed as certification requirements change.

1. Microcomputer integrated software package (word processing, spreadsheet, and database)
2. LCD video projector
3. VCR/DVD player
4. TV monitor
5. Digital camera
6. Smartboard
7. Overhead projector
8. Notebook computer



## Appendix A: Standards for Agricultural Technician Technology<sup>1</sup>

### SAF Safety

- Demonstrate safe work practices.
- Possess an adequate knowledge of safety skills and procedures of basic machine operation and diagnosis.

### HYD Hydraulics

- Calculate hydraulic pressure and flow using Pascal's law.
- Demonstrate the theory of operation of an open and closed center hydraulic system.
- Demonstrate the theory of hydraulic pump and motor operation.
- Demonstrate the theory of closed center, constant, and variable pressure hydraulic system operation.
- Diagnose problems of an open and closed center hydraulic system.
- Disassemble and repair a hydraulic component following tech manual instructions and specifications.
- Utilize a flow rater and test gauges to measure performance in a hydraulic system.
- Identify the symbols of an ISO hydraulic diagram, and locate the components on equipment.

### ELT Electrical Systems

- Use Ohms law to demonstrate/predict DC electrical behavior.
- Measure voltage and current flow in electrical circuits.
- Demonstrate proficient use of a digital multimeter.
- Recognize and test electrical components and devices.
- Identify symbols on an ISO electrical diagram, and locate the components on equipment.
- Use ISO schematics in diagnostic procedures.
- Follow diagnostic and repair procedures.

### HVA Mobile Heating, Ventilation, and Air Conditioning (HVAC) Systems

- Describe the fundamentals of operation of a mobile HVAC system.
- Perform test, repair, and retrofit procedures.
- Identify and describe the HVAC laws.
- Use test gauges and thermometers in measuring performance of the HVAC system.
- Demonstrate safe and proper handling of refrigerants.
- Charge and verify proper operation of various refrigerant systems.

### EFS Engines and Fuel Systems

- Disassemble and reassemble an engine using established procedures.
- Describe the theory of operation of an internal combustion engine.

---

<sup>1</sup> Standards for Agricultural Technician Technology were adapted from the John Deere Ag Tech Competency list.

- Utilize a dynamometer to measure engine performance and diagnostic testing procedures.
- Describe the theory of operation of various fuel systems.
- Perform diagnostic and repair procedures on various fuel systems.
- Identify and describe legal limitations with respect to fuel systems.

#### POW Power Trains

- Describe basic operational theories of power trains.
- Diagnose, disassemble, and reassemble various power trains.
- Describe basic operational theories associated with wet and dry brakes, torsion dampers, and torque converters.
- Diagnose, disassemble, and reassemble various wet and dry brakes, torsion dampers, and torque converters.
- Describe basic operational theories of final drive systems.
- Diagnose, disassemble, and reassemble various final drive and differential systems.

#### HAR Harvesting Systems

- Describe the fundamentals of various harvesting systems.
- Perform maintenance, diagnostic, and repair procedures on various harvesting systems.
- Set up and adjust harvesting equipment prior to and infield use to optimize performance according to conditions.

#### TSC Tillage, Seeding, and Chemical Application Systems

- Describe the fundamentals of machine operation included proper tractor compatibility.
- Describe primary and secondary tillage practices.
- Set up and adjust various tillage, seeding, and chemical application equipment prior to field use.
- Perform maintenance, diagnostic, and repair procedures on various tillage, seeding, and chemical application equipment.
- Set up and adjust various tillage, seeding, and chemical application equipment prior to and infield use to optimize tractor and implement performance according to conditions.
- Describe laws and regulations related to tillage, seeding, and chemical applications.
- Demonstrate use of protective apparatus when diagnosing, maintaining, and repairing chemical application equipment.

#### SER Service Department Policies and Procedures

- Describe the role of the service technician in the operation and profitability of a service department.
- Complete a time card and work order.
- Accurately communicate a complaint, a cause, and corrective actions for a given job.
- Locate and utilize all service information resources.
- Demonstrate positive customer relations.

- Describe continuing education opportunities.

TEC Advanced Technology

- Demonstrate proficiency in using service software and online resources.
- Demonstrate proficiency in using shop management software and hardware.

## Appendix B: Related Academic Standards<sup>2</sup>

### Reading

- R1 Interpret Graphic Information (forms, maps, reference sources)
- R2 Words in Context (same and opposite meaning)
- R3 Recall Information (details, sequence)
- R4 Construct Meaning (main idea, summary/paraphrase, compare/contrast, cause/effect)
- R5 Evaluate/Extend Meaning (fact/opinion, predict outcomes, point of view)

### Mathematics Computation

- M1 Addition of Whole Numbers (no regrouping, regrouping)
- M2 Subtraction of Whole Numbers (no regrouping, regrouping)
- M3 Multiplication of Whole Numbers (no regrouping, regrouping)
- M4 Division of Whole Numbers (no remainder, remainder)
- M5 Decimals (addition, subtraction, multiplication, division)
- M6 Fractions (addition, subtraction, multiplication, division)
- M7 Integers (addition, subtraction, multiplication, division)
- M8 Percents
- M9 Algebraic Operations

### Applied Mathematics

- A1 Numeration (ordering, place value, scientific notation)
- A2 Number Theory (ratio, proportion)
- A3 Data Interpretation (graph, table, chart, diagram)
- A4 Pre-Algebra and Algebra (equations, inequality)
- A5 Measurement (money, time, temperature, length, area, volume)
- A6 Geometry (angles, Pythagorean theory)
- A7 Computation in Context (whole numbers, decimals, fractions, algebraic operations)
- A8 Estimation (rounding, estimation)

### Language

- L1 Usage (pronoun, tense, subject/verb agreement, adjective, adverb)
- L2 Sentence Formation (fragments, run-on, clarity)
- L3 Paragraph Development (topic sentence, supporting sentence, sequence)
- L4 Capitalization (proper noun, titles)
- L5 Punctuation (comma, semicolon)
- L6 Writing Conventions (quotation marks, apostrophe, parts of a letter)

### Spelling

- S1 Vowel (short, long)
- S2 Consonant (variant spelling, silent letter)
- S3 Structural Unit (root, suffix)

---

<sup>2</sup> CTB/McGraw-Hill LLC. (2005). *Tests of adult basic education, forms 7 and 8*. Monterey, CA: Author. Reproduced with permission of CTB/McGraw-Hill LLC. TABE is a registered trademark of The McGraw-Hill Companies, Inc. Copyright © 2005 by CTB/McGraw-Hill LLC. Reproduction of this material is permitted for educational purposes only.

## Appendix C: 21st Century Skills<sup>3</sup>

### CSS1-21st Century Themes

#### CS1 Global Awareness

1. Using 21st century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

#### CS2 Financial, Economic, Business, and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

#### CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national and global levels
3. Understanding the local and global implications of civic decisions

#### CS4 Health Literacy

1. Obtaining, interpreting, and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance, and stress reduction
3. Using available information to make appropriate health-related decisions
4. Establishing and monitoring personal and family health goals
5. Understanding national and international public health and safety issues

#### CS5 Environmental Literacy

1. Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water, and ecosystems.
2. Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.).
3. Investigate and analyze environmental issues, and make accurate conclusions about effective solutions.
4. Take individual and collective action towards addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues).

### CSS2-Learning and Innovation Skills

#### CS6 Creativity and Innovation

1. Think Creatively

<sup>3</sup> *21st century skills*. (n.d.). Washington, DC: Partnership for 21st Century Skills.

- 2. Work Creatively with Others
- 3. Implement Innovations
- CS7 Critical Thinking and Problem Solving
  - 1. Reason Effectively
  - 2. Use Systems Thinking
  - 3. Make Judgments and Decisions
  - 4. Solve Problems
- CS8 Communication and Collaboration
  - 1. Communicate Clearly
  - 2. Collaborate with Others
- CSS3-Information, Media and Technology Skills
  - CS9 Information Literacy
    - 1. Access and Evaluate Information
    - 2. Use and Manage Information
  - CS10 Media Literacy
    - 1. Analyze Media
    - 2. Create Media Products
  - CS11 ICT Literacy
    - 1. Apply Technology Effectively
- CSS4-Life and Career Skills
  - CS12 Flexibility and Adaptability
    - 1. Adapt to Change
    - 2. Be Flexible
  - CS13 Initiative and Self-Direction
    - 1. Manage Goals and Time
    - 2. Work Independently
    - 3. Be Self-directed Learners
  - CS14 Social and Cross-Cultural Skills
    - 1. Interact Effectively with Others
    - 2. Work Effectively in Diverse Teams
  - CS15 Productivity and Accountability
    - 1. Manage Projects
    - 2. Produce Results
  - CS16 Leadership and Responsibility
    - 1. Guide and Lead Others
    - 2. Be Responsible to Others