# Advanced Agricultural Mechanics Course No. 18402 Credit: 1.0

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| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes:Agricultural Technology and Mechanical Systems (01.0201)

Course Description: Course provides students with the engineering and power technology principles, skills, and knowledge that are specifically applicable to the agricultural industry. Typical topics include the operation, maintenance, and repair of power, electrical, hydraulic, and mechanical systems.

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

**Prerequisites: 18401 - Agricultural Mechanics and either 18001 – Introduction to Agricultural or 18002 - Agriscience**

## Benchmark 1: Safety / Ag Mechanics Lab Orientation w/ Tool Use

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Demonstrate proper attire and PPE use for various tasks in a shop, jobsite, and/or laboratory. |  |
| 1.2 | Identify and demonstrate proper methods of shop/lab clean-up. |  |
| 1.3 | Identify various tool storage locations. |  |
| 1.4 | Learn the components of the fire triangle. |  |
| 1.5 | Explain the proper use of a fire extinguisher. |  |
| 1.6 | Demonstrate the operation and pinch points of hand tools. |  |
| 1.7 | Demonstrate the operation and pinch points of agricultural equipment. |  |
| 1.8 | Identify and contact local businesses that require advanced agricultural mechanics skills. |  |

## Benchmark 2: Power Systems

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Identify principles and operations of internal combustion engines. |  |
| 2.2 | Identify parts and components of power system in the agriculture industry. |  |
| 2.3 | Troubleshoot engines, power transmission, fuels systems, and electrical systems. |  |
| 2.4 | Perform preventive maintenance on various engine systems; including the crankcase breather, air cleaner, and muffler. |  |
| 2.5 | Use manufacturer’s service manuals to determine engine specifications and explain why this information is necessary when servicing an engine. |  |

## Benchmark 3: FLUID POWER

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Identify principles of fluid power, including Pascal’s law. |  |
| 3.2 | Calculate the amount of pressure in differing lines and systems. |  |
| 3.3 | Compare and contrast applications of fluid power: pneumatics and hydraulics. |  |
| 3.4 | Identify parts and components of a fluid power systems. |  |
| 3.5 | Read schematics in a fluid power system. |  |
| 3.6 | Model an electrohydrualic or electro-pneumatic system. |  |
| 3.7 | Inspect hydraulic hoses for wear. |  |
| 3.8 | Select fittings for hydrualic fittings. |  |

## Benchmark 4: ELECTRONICS & AUTOMATION IN AGRICULTURE APPLICATIONS

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Compare and contrast AC and DC currents. |  |
| 4.2 | Collect readings with a digital mutlimeter. |  |
| 4.3 | Identify function and application of electronical controls:  |  |
| 4.4 | Examine and categorize electrical control components used (diodes, bridge rectifier, potentiometers, solenoids, and relays). |  |
| 4.5 | Model the function of basic sensors (flow rate, thermostat, soil moisture, pressure). |  |
| 4.6 | Locate sensors on agricultural equipment and describe function. |  |
| 4.7 | Assess the functions of agriculture control systems using programmable logic controllers. |  |
| 4.8 | Analyze schematic drawings for electrical control systems.  |  |
| 4.9 | Troubleshoot electrical control system performance problems.  |  |
| 4.10 | Model a CAN Bus network. |  |

## Benchmark 5: AGRICULTURE TECHNOLOGY

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Identify how electronics are used in the agriculture industry. |  |
| 5.2 | Explain how precision technologies are used. |  |
| 5.3 | Identify monitoring systems and demonstrate the benefits of these systems. |  |
| 5.4 | Troubleshoot a remote sensing system. |  |
| 5.5 | Identify automation/robotics components and how they benefit the agriculture industry. |  |
| 5.6 | Explain the laws of using agriculture technology.  |  |
| 5.7 | Research emerging technologies in your local agriculture community (UAV, remote sensing, automation in food processing, robotic welding, robotic agronomy). |  |
| 5.8 | Develop a skillset of emerging technologies in your local agriculture community (UAV, remote sensing, automation in food processing, robotic welding, robotic agronomy). |  |

## Benchmark 6: Precision Systems

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Research and summarize impact of utilizing geospatial technologies in agriculture applications. |  |
| 6.2 | Examine the components of precision technologies used in agriculture applications. |  |
| 6.3 | Practice using GNSS equipment to plot data points . |  |
| 6.4 | Create agronomic maps (yield, fertility, pH, etc) utilizing GIS software. |  |
| 6.5 | Prescribe agronomic solutions with GIS data using software. |  |
| 6.6 | Plot an A-B line on a tractor with equipment or simulated software. |  |
| 6.7 | Apply remote sensing techonlogies to precision irrigation systems. |  |

## Benchmark 7: POWER TRAINS

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Identify components of a power train (clutch, bearings, transmission, gearbox). |  |
| 7.2 | Compare speed and torque with various gear ratios. |  |
| 7.3 | Inspect or model a transmission. |  |
| 7.4 | Replace bearings in agricultural equipment. |  |
| 7.5 | Identify the size and type of a tire using DOT codes. |  |
| 7.6 | Ballast agricultural equipment for safety and efficiency. |  |

## Benchmark 8: TECHNICIAN SKILLS

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 8.1 | Complete a work/repair order. |  |
| 8.2 | Create a bill of materials for a repair project. |  |
| 8.3 | Identify near misses. |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

(785) 296-4908

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