# **AG. 227** AGRICULTURAL MACHINERY

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COURSE DESCRIPTION: A course designed to develop skills in selection, operation, maintenance and management of agricultural machinery.

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| **UNITS OF INSTRUCTION** | **MINUTES OF INSTRUCTION** |
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| Safety | 235 |
| Tillage Equipment | 705 |
| Seeding and Planting Equipment | 705 |
| Pest Control and Fertilizing Equipment | 705 |
| Harvesting Equipment | 1175 |
| Agricultural Hydraulic Systems | 235 |
| Agricultural Machinery Management | 470 |
| TOTAL MINUTES | 4,230 |

## A. Safety

1. Identify safety equipment necessary for agricultural power technology
2. Apply basic laboratory safety instruction
3. Describe safety practices when using electrical equipment
4. Apply safety practices when using tractors, machinery or hydraulics

## B. Tillage Equipment

1. Identify the characteristics and applications of the major types of tillage equipment
2. Read and interpret an operator's manual for a major type of tillage equipment
3. Calculate the potential field capacity of various sizes of tillage equipment
4. Operate tillage equipment safely under field and transport conditions
5. Set up the tractor for primary tillage operations
6. Lubricate the appropriate points of primary tillage equipment
7. Adjust primary tillage equipment for initial operation
8. Trouble-shoot primary tillage equipment and operation under field and shop conditions

## C. Seeding and Planting Equipment

1. Identify the major types of planting equipment
2. Describe the major characteristics and applications of the different types of planting equipment
3. Read and interpret and operator's manual for planting equipment
4. Identify the major components of the different types of planting equipment
5. Operate planting equipment safely under field and transport situations
6. Adjust planter row spacing on planting equipment
7. Adjust depth of seed placement on planting equipment
8. Service and maintain fertilizer and seed hoppers, agitators, seed tubes and fittings on planting equipment
9. Prepare planting equipment for storage
10. Identify the major types of seed metering mechanisms used on planters
11. Calibrate seed, fertilizer, herbicide and insecticide application rates under field conditions
12. Trouble-shoot planting equipment operation under field and shop conditions

## D. Pest Control and Fertilizing Equipment

1. Describe the major functions of chemical application equipment
2. Identify the types of chemical application equipment
3. Describe the characteristics and applications of the major types of chemical application equipment
4. Describe the fundamentals of operation of the major types of sprayer pumps
5. Trouble-shoot sprayer pump operation
6. Describe the major characteristics and applications of the different types of sprayer nozzles
7. Read and interpret nozzle selection literature
8. Service and maintain sprayer nozzles and fittings
9. Describe the importance of accurate crop spraying equipment calibration
10. Select crop sprayer nozzles for desired application rate and spraying pressure
11. Calculate the required quantities of solution for spraying specific acreages

## E. Harvesting Equipment

1. Describe the alternative methods of harvesting crops.
2. Describe the characteristics and applications of the major types of harvesting equipment
3. Read and interpret an operator's manual for harvesting equipment
4. Calculate the potential field capacity for various sizes of harvesting equipment
5. Identify the sources of harvest losses
6. Operate harvesting equipment safely under field and transport situations
7. Prepare harvesting equipment for storage

8. Describe adjustments and operating controls on the basic types of harvesting equipment
9. Trouble-shoot harvesting equipment operation under field and shop conditions

## F. Agricultural Hydraulic Systems

1. Identify the applications of hydraulics in agriculture
2. Identify the components of a hydraulics system
3. Define terminology associated with hydraulic systems
4. Describe operating principles of hydraulic systems
5. List the advantages and disadvantages of utilizing hydraulics in agriculture
6. Read and interpret basic hydraulic schematic diagrams
7. Select the proper hydraulic fluid for a specific hydraulic system and operating condition
8. Drain, flush and refill hydraulic systems on agricultural equipment
9. Service and maintain hydraulic seals and packings
10. Select hydraulic tubing, pipe and remove hoses to fulfill specific pressure, volume and exposure requirements
11. Service, maintain and/or operate hydraulic fittings and couplers
12. Service and maintain hydraulic fluid filters
13. Trouble-shoot hydraulic motor operating problems
14. Select hydraulic motors to fit specific applications on agriculture equipment and power units
15. Determine relief valve pressure setting by the T-test method

## G. Agricultural Machinery Management

1. Describe the relationship between machinery costs and other farm costs
2. Identify the basic management skills required to manage agricultural machinery
3. Describe the importance of good records in a farm machinery management program
4. List the types of records used in a farm machinery management program
5. Identify the sources of information that can be utilized to provide the farmer with assistance for his machinery management program
6. Calculate field capacity for various types of agricultural equipment and machinery
7. Calculate the material capacity for various types of agricultural equipment and machinery
8. Calculate throughput capacity for various types of agricultural equipment and machinery
9. Identify the variables that effect the theoretical capacity of agricultural machinery
10. Calculate theoretical capacity for various types of agricultural machinery
11. Define the term "timeliness" as it relates to agricultural machinery

**G. Agricultural Machinery Management cont**.

12. Describe how the time available for specific cropping operations effects decisions regarding machinery capacity requirements
13. Estimate economic and crop yield losses due to lost time or lack of timeliness in various cropping operations using a nomograph
14. Calculate the time available for specific cropping operations from past farm management records and university research data
15. List the factors that should be considered when matching agricultural machinery to a cropping system and/or power units
16. Compare the calculated ownership costs of various types of agricultural machinery and power units with differing capacities
17. List the factors that affect the field efficiency of agricultural machinery
18. Identify inefficient use of agricultural machinery and power units in a specific farming operation
19. Describe the ways that could be used to reduce the horsepower requirements for various types of agricultural machinery
20. Calculate horsepower requirements for various types of machinery based on needed capacity and available time
21. Describe the basic reasons why it is important to maintain a horsepower reserve when calculating horsepower requirements for agricultural machinery
22. List the factors to consider when selecting agricultural power units
23. Describe the methods used to rate agricultural power units and engines
24. Read an interpret university and manufacturer's literature, such as the Nebraska Tractor Tests, as it relates to the performance and specifications of agricultural power units and engines
25. Read and interpret data from a tractor dynometer performance test
26. List the type of fixed costs that apply to agricultural machinery
27. Describe the term "depreciation" as it relates to agricultural machinery
28. Describe the ways that can be used to prevent rapid depreciation of agricultural machinery
29. Identify the major methods used in a management program to depreciate agricultural machinery
30. Estimate the average annual fixed cost for various types and sizes of agricultural machinery
31. List the types of operating costs that apply to agricultural machinery
32. Calculate the total operating costs for various types of agricultural machinery and power units given the necessary data
33. List the alternatives to ownership of agricultural machinery
34. List the advantages and disadvantages of each of the alternatives to ownership
35. Calculate the break-even point in acres per year and tons per year of various types of agricultural machinery
36. Compare leasing and rental costs to ownership costs of various types of agricultural machinery
37. Estimate the average life expectancy of various types of agricultural machinery
38. Estimate the optimum time to trade-in various types of agricultural machinery

39. List the factors that effect the trade-in value of various types of agricultural machinery
40. Read and interpret prepared tables, such as tractor and implement bluebooks, to estimate trade-in and salvage value of agricultural machinery