West Virginia CTE

The Science of Agriculture

Plant Science

1. **Identify plants & plant diseases.** 0102.1
   1. Identify plants including herbaceous plants, annual, biennial, and perennial types. 0102.1.1
   2. Identify weed species. 0102.1.2
   3. Demonstrate knowledge of the systematic classification of plants. 0102.1.3
   4. Assess and identify symptoms of crop diseases. 0102.1.4
   5. Explain the processes and benefits of crop rotation. 0102.1.5

2. **Describe entomology.** 0102.2
   1. Identify insect pests. 0102.2.1
   2. Explain the steps of metamorphosis. 0102.2.2
   3. Define Integrated Pest Management. 0102.2.3

3. **Demonstrate understanding of soil preparation, propagation techniques, and regulating environmental conditions in plant production systems.** 0102.3
   1. Prepare soil for planting, and plant or transplant seeds, bulbs, and cuttings. 0102.3.1
   2. Plant seeds in specified areas and count the resulting plants to determine the percentage of seeds that germinated. 0102.3.2
   3. Perform duties including propagating varieties of plant materials, collecting and germinating seeds, maintaining cuttings of plants, and controlling environmental conditions, and regulating irrigation systems. 0102.3.3
   4. Prepare data summaries, reports, or analyses that include results, charts, or graphs to document research findings and results. 0102.3.4
   5. Research the requirement of becoming a USDA Certified Organic crop producer. 0102.3.5

Soil Science

4. **Identify components of soil (e.g., soil texture, soil horizon).** 0102.4
   1. Study soil characteristics to classify soils on the basis of factors such as geographic location, landscape position, or soil properties. 0102.4.1

5 **Demonstrate knowledge of soil nutrients (e.g., soil pH, calculate amounts of fertilizer, eutrophication).** 0102.5

1 Analyze soil to determine types or quantities of fertilizer required for maximum crop production. 0102.5.1

2 Conduct studies of nitrogen or alternative fertilizer application methods, quantities, or timing to ensure satisfaction of crop needs and minimization of leaching, runoff, or denitrification. 0102.5.2

3 Explore components of urban and suburban market gardening. 0102.5.3

6 **Describe land capability use (e.g., land capability class, soil management practices).** 0102.6

1 Provide information or recommendations to farmers or other landowners regarding ways in which they can best use land, promote plant growth, or avoid or correct problems such as erosion. 0102.6.1

2 Investigate responses of soils to specific management practices to determine the use capabilities of soils and the effects of alternative practices on soil productivity. 0102.6.2

3 Investigate soil problems and poor water quality to determine sources and effects. 0102.6.3

4 Assess comparative soil erosion from various planting or tillage systems, such as conservation tillage with mulch or ridge till systems, no-till systems, or conventional tillage systems with or without moldboard plows. 0102.6.4

Animal Nutrition

7 **Determine nutritional needs of livestock (e.g., essential nutrients, protein, calculate feed, Pearson Square).** 0102.7

1 Study effects of feed on quality and quantity of animal products, such as eggs and milk. 0102.7.1

2 Study nutritional requirements of animals and nutritive values of animal feed materials. 0102.7.2

3 Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs. 0102.7.3

4 Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production. 0102.7.4

5 Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements, and performance. 0102.7.5

6 Research the components of becoming a USDA Certified Organic livestock producer. 0102.7.6

8 **Differentiate forage production (e.g., carrying capacity).** 0102.8

1 Monitor pasture or grazing land use to ensure that livestock are properly fed or that conservation methods, such as rotational grazing, are used. 0102.8.1

Small Gas Engine Maintenance and Repair

9 Cycles of a small engine. 0102.9

1. Discuss the cycle of a 2-cycle engine. 0102.9.1
2. Discuss the cycle of a 4-stroke engine. 0102.9.2

10 Identify parts. 0102.10

1. Identify the parts of small engine components 0102.10.1
2. Demonstrate knowledge of the usage of a small engine parts manual. 0102.10.2

11 Demonstrate knowledge of small engine maintenance (e.g., service manuals, fluid levels). 0102.11

1. Repair and maintain gasoline engines used to power equipment such as portable saws, rototillers, lawn mowers, generators, and compressors. 0102.11.1
2. Adjust points, valves, carburetors, distributors, and spark plug gaps, using feeler gauges. 0102.11.2
3. Reassemble engines after repair or maintenance work is complete and ensure that the reassembled engine is operational. 0102.11.3
4. Record repairs made, time spent, and parts used. 0102.11.4
5. Perform routine maintenance such as cleaning and oiling parts, honing cylinders, and tuning ignition systems. 0102.11.5
6. Obtain problem descriptions from customers and prepare cost estimates for repairs. 0102.11.6
7. Operate, test and inspect engines to determine malfunctions, to locate missing and broken parts, and to verify repairs, using diagnostic instruments. 0102.11.7
8. Repair or replace defective parts such as magnetos, water pumps, gears, pistons, and carburetors, using hand tools. 0102.11.8
9. Dismantle engines, safely use hand tools, and examine parts for defects. 0102.11.9
10. Remove engines from equipment, and position and bolt engines to repair stands. 0102.11.10

Welding

12 Understand welding-related safety. 0102.12

1. Identify common safety hazards of welding. 0102.12.1
2. Identify specific PPE needs of welding. 0102.12.2
3. Demonstrate knowledge of a safe, properly ventilated welding area. 0102.12.3

13 Types of welding joints. 0102.13

1. Identify types of weld joints including butt, fillet, lap, etc. 0102.13.1

14 Discuss welder set-up and process. 0102.14

1. Ignite torches or start power supplies and strike arcs by touching electrodes to metals being welded, completing electrical circuits. 0102.14.1
2. Explain the difference between Gas Metal Arc Welding (GMAW) and Flux Core Arc Welding (FCAW). 0102.14.2
3. Explain electrode coding and selection. 0102.14.3
4. Clamp, hold, tack-weld, heat-bend, grind or bolt component parts to obtain required configurations and positions for welding. 0102.14.4
5. Recognize, set up, and operate hand and power tools common to the welding trade, such as shielded metal arc and gas metal arc welding equipment. 0102.14.5
6. Lay out, position, align, and secure parts and assemblies prior to assembly, using straightedges, combination squares, calipers, and rulers. 0102.14.6
7. Chip or grind off excess weld, slag, or spatter, using hand scrapers or power chippers, portable grinders, or arc-cutting equipment. 0102.14.7
8. Connect and turn regulator valves to activate and adjust gas flow and pressure so that desired flames are obtained. 0102.14.8
9. Select and install torches, torch tips, filler rods, and flux, according to welding chart specifications or types and thicknesses of metals. 0102.14.9
10. Remove rough spots from work pieces using portable grinders, hand files, or scrapers. 0102.14.10
11. Position and secure work pieces, using hoists, cranes, wire, and banding machines or hand tools. 0102.14.11
12. Clean or degrease parts, using wire brushes, portable grinders, or chemical baths. 0102.14.12

Natural Resources

15 Define natural resources and ecosystems. 0102.15

1. Identify the natural resources derived from West Virginia. 0102.15.1
2. Describe the components of a West Virginia biome. 0102.15.2
3. Define ecology. 0102.15.3
4. Identify and describe areas of forest wetlands in West Virginia. 0102.15.4

16 Recognize methods of identifying trees, wildlife, and aquatic species. 0102.16

1. Identify common tree species and other woody plants in West Virginia. 0102.16.1
2. Identify common WV wildlife species. 0102.16.2
3. Identify aquatic species including macroinvertebrates, fish, plants, invertebrates, and predator species. 0102.16.3

17 Demonstrate knowledge of forest and wildlife management. 0102.17

1. Identify ways in which forest stands may be improved and determine forest harvest timelines. 0102.17.1
2. Identify methods of wildlife habitat improvement. 0102.17.2
3. Identify forest products. 0102.17.3
4. Describe techniques used in the harvesting of wildlife. 0102.17.4

Agricultural Innovation and Technology

18 Technology in Agriculture. 0102.18

1. Identify emerging technology in agriculture. 0102.18.1
2. Identify career opportunities in technology, innovation, and entrepreneurship in agriculture. 0102.18.2

19 Agricultural Innovation & Current Issues. 0102.19

1. Identify a current question in agriculture and then develop a hypothesis, conduct research, and present findings. 0102.19.1
2. Identify a current issue or problem in agriculture and work as a group to find a solution to the problem. 0102.19.2
3. Research the components and requirements of producing, processing, and selling agricultural products from the home/farm. 0102.19.3
4. Design an agrotourism business. 0102.19.4

Foundations of Agriculture, Food, and Natural Resources

20 Demonstrate knowledge of leadership development through FFA. 0102.20

1. Participate in FFA leadership opportunities offered at the local, state, and national level. 0102.20.1
2. Participate in FFA intracurricular competitive opportunities at the local, state, and national level. 0102.20.2
3. Participate in community service and career awareness activities at the local, state, and national level. 0102.20.3