

---

# Wisconsin Youth Apprenticeship

## AGRICULTURE, FOOD & NATURAL RESOURCES (AFNR)

### PROGRAM GUIDE



Department of Workforce Development

September 2016

---

For more information contact:

Department of Workforce Development  
P.O. Box 7972  
Madison, WI 53707-7972



**©2016.** This material may not be copied or reproduced by a private-for-profit organization without the permission of the Department of Workforce Development.

DWD – DET is an equal opportunity employer and service provider. If you have a disability and need to access this information in an alternate format, or need it translated to another language, please contact: (608) 266-6889 (Voice). Deaf hard of hearing, speech impaired callers may reach DWD - DET staff by calling Wisconsin Relay Services 711 or by TTY at (866) 275-1165.

# AGRICULTURE, FOOD & NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP PROGRAM GUIDE

## Description

---

Agricultural duties vary widely from raising plants and livestock to operating large equipment to caring for companion animals. Natural Resources jobs involve working directly with the natural environment including air, water, and land. Job openings are expected to be numerous with opportunities for agricultural equipment operators, and crop, greenhouse, and nursery farm workers to be particularly plentiful. Additionally, employment for veterinary technologists is expected to grow much faster than average. Environmental science technician jobs, that monitor the environment and investigate sources of pollution, will grow faster than average.<sup>1</sup> Market pressures will continue the long-term trend towards consolidation into fewer and larger farms and ranches; however, recent scientific studies are supporting the trend of utilizing more locally grown and locally processed agricultural products.

The Agriculture, Food and Natural Resources (AFNR) career cluster involves careers in the planning, implementation, production, management, processing, and/or marketing of agricultural commodities and services. This Youth Apprenticeship occupational area focuses on five pathways within the Agriculture, Food and Natural Resources industry: Animal Systems, Plant Systems, Power, Structural and Technical Systems and Environmental Systems. Career exploration in the Food Product and Processing System pathway can be accomplished under the Manufacturing Youth Apprenticeship program.

People who work in the Plant Systems pathway study all types of plants and their growth. They are the producers of the food, feed, fiber, and landscaping crops meant to support a growing population while conserving natural resources and maintaining the environment. Careers in the Animal Systems pathway vary from breeding, raising and processing animals and animal products to the care and feeding of all sorts of animals themselves. Agricultural and farm equipment mechanics are responsible for the maintenance, repair, and installation of machines that increase the efficiency of farming activities, such as planting, harvesting, and irrigating crops. Agricultural mechanics also service and repair smaller lawn and garden equipment operated by suburban homeowners. Modern farm equipment utilizes computers, electronics, and hydraulics, which means that workers need to continually update their skills. In fact, what was once a general repairer's job has become a more specialized technical field in the farm industry. As a result, many farmers rely on farm equipment dealers to maintain and

---

<sup>1</sup> U.S. Dept of Labor, Occupational Profiles, [www.bls.gov](http://www.bls.gov). Accessed 4/22/13.

repair their machinery because the equipment is more complex than in the past. Another occupation in this pathway is a parts specialist. Within the industry there is a need for sales and customer service representatives to assist internal and external clients with parts management, marketing, and equipment maintenance. Environmental Systems pathway careers include occupations involved in water and air pollution control, recycling, waste disposal and public health issues.<sup>2</sup>

The Youth Apprenticeship Program was approved by the Wisconsin State legislature in 1991 to provide a direct link between business, schools, and youth to meet the demands of technology, teamwork, communication, and leadership.

Wisconsin Youth Apprenticeship (YA) is a rigorous program that combines academic and related technical classroom instruction with mentored on the job learning for high school students. By training youth apprentices, employers play an active role in shaping the quality of their future workforce, improving the skill level of potential workers, and enhancing their competitive positioning in the marketplace. Employers, school districts, local consortiums, parents, and potential YA students are referred to the *Youth Apprenticeship Program Operations Manual* ([http://dwd.wisconsin.gov/youthapprenticeship/pdf/program\\_operations\\_manual\\_2015.pdf](http://dwd.wisconsin.gov/youthapprenticeship/pdf/program_operations_manual_2015.pdf)) for general YA Program requirements.

## **Objective**

---

The Wisconsin Agriculture, Food and Natural Resources (AFNR) YA Program is designed to provide students with a working understanding of occupational and technical skills in four of the seven pathways within the AFNR industry. This program provides the framework for educators and industry to work together to produce work-ready, entry-level employees that will compete favorably in a global market, as well as, provide for post-secondary educational advancement while integrating work-based learning in the school and worksite.

The following features distinguish a YA Program from other similar youth school to work programs.

- Level Two Youth Apprenticeship is a two-year program for high school juniors and seniors with an interest in a particular field; e.g., farming crops. One-year Youth Apprenticeship Programs are also available to pursue.
- Youth apprentices, parents, employers, YA program coordinators, and school districts enter into a written agreement approved by the Department of Workforce Development.

---

<sup>2</sup> States' Career Clusters, Agriculture, Food, & Natural Resources Brochure. [www.careerclusters.org](http://www.careerclusters.org). Accessed 5/21/10.

- Statewide skills are established by the industry, making the youth apprentice skill set more relevant to the state's employers.
- Youth apprentices are trained at the worksite by skilled mentors and are paid minimum wage or better for their work. Students average 10-15 hours/week.
- Youth apprentices receive a high school diploma and a Certificate of Occupational Proficiency from the Wisconsin Department of Workforce Development (DWD) at graduation.
- Youth apprentices may receive advanced standing credit and/or transcribed credit for the YA Program at a Wisconsin Technical College and/or at some four year colleges. See **Appendix F** for current details.
- Statewide skill standards focus on skills and knowledge needed by employers for entry level employment in the AFNR industry.

Students apply and are interviewed by AFNR employers for positions in the AFNR YA Program. The state approved skill standards and program guide for the Agriculture, Food and Natural Resources YA Program are used in both the classroom instruction and worksite learning. If the local school district is unable to provide the related technical classroom instruction courses, they may contract with their local technical college or employer practitioners to do so.

The skill standards are competency based. Competencies are performance-based outcome statements of occupational related skills defined by representatives of AFNR worksites throughout Wisconsin and aligned with national skill standards. The competencies in the program are aligned with learning objectives from the Center for Agricultural and Environmental Research & Training (CAERT) ([www.caert.net](http://www.caert.net)) and the National Association of State Directors of Career and Technical Education Consortium (NASDCTEc) Standards in Agriculture, Food and Natural Resources (AFNR), (<http://www.careerclusters.org/>) for four of the AFNR Career Cluster pathways: Plant Systems, Animal Systems, Agribusiness Systems, and Environmental Systems. Competencies for Food Production can be found in the Manufacturing YA program.

The competencies will be taught at the worksite in combination with supportive, related technical classroom instruction. While the skill competencies are established statewide, program implementation and oversight occurs through local consortium committees to assure local needs are met.

## **Target Population**

---

This Youth Apprenticeship occupational area focuses on having Agriculture, Food and Natural Resources (AFNR) YA students acquire basic skills pertinent to understanding and working with plants or animals or water in the first year along with the core employability and safety skills. Students will acquire basic concepts needed to maintain and support animal care; cultivate and support plant growth; or manage water quality in the environment or industry.

The second year allows AFNR students to develop skills in the specific specializations dependent on their worksite placement and area of interest. In the **Animal Pathway**, AFNR YA students choose to focus on large animals or herd/ranch animal care, while others may choose to work with small lab or companion animals. In the **Plant Pathway**, three choices exist for specialization. The Crops Unit allows AFNR YA student to work on farms growing and harvesting food, feed or fiber. AFNR YA students in the Greenhouse/Floral Unit learn to work in settings related to growing ornamental, floral and other plant types for various uses. In the Landscaping Unit, AFNR YA students explore all aspects of landscaping from design, to bidding, to creating and maintaining the landscaped area. In the **Environmental Systems Pathway**, water resources are managed for quality and public health. In the **Power, Structural & Technical Systems Pathway**, students have two options for specialization. The Agriculture Mechanics Technician Unit allows AFNR YA students to gain experience in working with agricultural machinery and equipment.

All students successfully meeting current high school graduation requirements and with a good attendance record for that year are encouraged to apply for the Agriculture, Food, & Natural Resources (AFNR) Youth Apprenticeship (YA) Program. The student must apply to the program in the year previous to program entry and be on track toward fulfilling high school graduation requirements in their school district. SEE **Appendix G** for students entering or continuing the AFNR YA Program in 2013.

All Youth Apprentices must complete the industry-wide foundational skill competencies consisting of competencies in core employability skills and safety. The Required Skill competencies may be completed concurrently with the specific technical skills.

Potential AFNR youth apprentices will be required to complete a minimum of 450 work hours with 180 hours (2 semesters) of related technical classroom instruction for a Level One (1-year) Agriculture, Food, & Natural Resources (AFNR) YA Program or a minimum of 900 work hours with 360 hours (4 semesters) of related technical classroom instruction for a Level Two (2-year) AFNR YA program.

AFNR YA students are required to perform all of the Core and Safety skills. **Level One (one year)** YA students also are required to complete the one year Basics Unit in their selected pathway. **Level Two (two year)** YA students are to choose another one year specific unit, based on their area of interest and their worksite placement.

Worksites can be chosen from any number of AFNR settings including farms, landscapers, greenhouses, florists, orchards, vet offices, farm equipment dealerships, lab animal facilities, water industries, water treatment plants, and so on PROVIDED THAT the competencies related to the TASKS and EQUIPMENT USED are allowable by DWD Child Labor Laws. See **Appendix A** for more detail or contact the Department of Workforce Development's Equal Rights Division/Labor Standards Bureau at 608-266-6860 for questions regarding child labor laws.

## **AFNR Units**

### **1. Animal Pathway-**

- Animal Basics Unit- REQUIRED FIRST
- Large Animal/Herd Unit
- Small Animal/Vet Assistant Unit

### **2. Plants Pathway-**

- Plant Basics Unit- REQUIRED FIRST
- Crops Unit
- Greenhouse/Floral Unit
- Landscaping Unit

### **3. Environmental Systems Pathway-**

- Basic Water Resources Unit- REQUIRED FIRST
- Advanced Water Resources Unit

### **4. Power, Structural & Technical Systems Pathway-**

- Agriculture Mechanics Technician Unit
- Parts, Sales and Service Unit

## **AFNR Program Responsibilities**

The following responsibilities are outlined for individuals involved in the Agriculture, Food, & Natural Resources (AFNR) YA Program.

### **Students–**

1. Maintain academic skills and attendance at the high school to remain on track for high school graduation.
2. Participate in progress reviews as scheduled.
3. Exhibit maturity and responsibility to meet requirements of employment as designated by the employer.

### **Parents or Guardians-**

4. Ensure that adequate transportation is available to and from the worksite.

5. Participate in student progress reviews as scheduled.

### **School District-**

6. Recruit students and coordinate student enrollment in the program with the consortiums and/or employers.
7. Integrate the YA Program related technical classroom instruction and worksite training into the student's overall education program with high school graduation credit issued for each semester successfully completed.
8. Participate in student progress reviews as scheduled.

### **YA Program Coordinators-**

9. Apply and maintain approval from the DWD to operate a YA Program.
10. Ensure a minimum of 450 hours of worksite instruction/experience plus a minimum of 180 hours of related technical classroom instruction for each one year YA program.
11. Establish and meet regularly with an advisory committee that will identify when and where tasks will be taught during the AFNR YA Program.
12. Develop and maintain a yearly commitment with participating high schools, technical colleges, and local businesses to accommodate the number of students involved in the AFNR YA Program.
13. Establish and maintain a YA student grievance procedure.
14. Provide employer mentor training.

### **Related Technical Classroom Instruction Faculty-**

15. Qualify in the specialty areas being taught in the YA Program.

### **Employers and Worksite Mentors-**

16. SEE **Appendix B** – Agriculture, Food, & Natural Resources (AFNR) YA Implementation Guide for Employers.
17. Participate in a mentor training session and provide on the job training of the Youth Apprentices.

### **Department of Workforce Development-**

18. Monitor national and state regulatory agencies, such as OSHA, for changes and impact on the AFNR Youth Apprenticeship Program.

## **Program Guide Organization**

---

The competencies in the program are aligned with learning objectives from the Center for Agricultural and Environmental Research & Training (CAERT) ([www.caert.net](http://www.caert.net)) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) Standards in Agriculture, Food and Natural Resources (AFNR), <http://www.careerclusters.org/> for four of the AFNR Career Cluster pathways: Plant Systems, Animal Systems, Agribusiness Systems, Environmental Systems and Power, Structural and Technical Systems.

The AFNR YA Program also requires that Related Technical Classroom Instruction is provided to support attainment of the knowledge necessary to master the competencies. While recommendations for specific Related Technical Classroom Instruction are detailed separately in **Appendix C**, instructional requirements will vary depending on local consortium and advisory group decisions. It is strongly advised that local consortiums work with their advisory groups to determine appropriate Related Technical Classroom Instruction based on their local needs and resources.

The Youth Apprenticeship Program curriculum is written and organized according to the Worldwide Instructional Design System (WIDS) format and includes the Agriculture, Food, & Natural Resources (AFNR) YA Skill Standards Checklist, Program Appendices and Unit Appendices for the program. Overall progress is documented on the Skill Standards Checklist which lists skill level achievement for each competency achieved. The Unit Appendices outline each skill competency with corresponding performance standards and learning objectives. The Performance Standards describe the tasks and behaviors, as applicable, that employers should look for in order to evaluate the competency. The Learning Objectives outline the recommended content to be covered in the related technical classroom instruction. SEE **Appendix D** - Wisconsin Instructional Design System (WIDS) Format and Youth Apprenticeship Program Guide Terms and **Appendix E** - Use and Distribution of the Curriculum for further details.

## **Evaluation**

---

The student must successfully complete the related technical classroom instruction and demonstrate the minimum skill level required on the Agriculture, Food, & Natural Resources (AFNR) YA Skill Standards Checklist for each competency according to the applicable curriculum. Worksite mentors and/or instructors use this checklist to evaluate the learner on each of the required skills. It is the responsibility of the mentor(s) to rate the students skill level on all tasks performed at the worksite.

## **AFNR YA Program Completion**

Upon successful completion of high school and the Level Two (2 year) AFNR YA Program requirements, the youth apprentice will receive a high school diploma and the applicable Certificate of Occupational Proficiency from the Department of Workforce

Development indicating “Agriculture, Food, & Natural Resources Youth Apprenticeship.” Youth Apprentices who successfully complete a Level One (1 year) AFNR YA Program and who are on track for graduation will be eligible for a Level One Certificate from the Department of Workforce Development. Furthermore, the YA students may;

1. Continue to work in the AFNR industry.
2. Apply to a registered apprenticeship.
3. Pursue a degree or diploma from a Wisconsin Technical College with advanced standing and/or transcribed credit.
4. Apply for admission to a four-year University of Wisconsin school with high school academic elective credit for admission.
5. Go into military service.

SEE **Appendix F** for current agreements for post-secondary credit at Wisconsin Technical Colleges and University of Wisconsin colleges.

## Appendices

---

Appendix A - Work Contracts, Child Labor Laws, Liability & Insurance

Appendix B - Agriculture, Food and Natural Resources YA Implementation Guide for Employers

- Benefits to the Employer
- Role of the Employer
- Role of the Mentor
- Checklist for Program Participation
- Checklist for Program Operation
- Frequently Asked Questions
- Work Contracts, Child Labor Laws, Liability & Insurance (insert Appendix A)

Appendix C - Recommended Related Technical Classroom Instruction

Appendix D - Wisconsin Instructional Design System (WIDS) Format and Youth Apprenticeship Program Guide Terms

Appendix E - Use and Distribution of the Curriculum

Appendix F - Post Secondary Credits

Appendix G - Grandfather Clause – Program Transition Guidelines

Appendix H - Agriculture, Food, & Natural Resources (AFNR) Skill Standards Checklist

Appendix I - Agriculture, Food, & Natural Resources (AFNR) YA Course Outcome Summary: Overview and Table of Contents (COS)

Appendix J- Agriculture, Food, & Natural Resources (AFNR) Required Skills Curriculum (Units 1-2)

Appendix K- Animal Basics Unit (Unit 3)

Appendix L- Large Animal/Herd Unit (Unit 4)

Appendix M- Small Animal/Vet Assistant Unit (Unit 5)

Appendix N- Plant Basics Unit (Unit 6)

Appendix O- Crops Unit (Unit 7)

Appendix P- Greenhouse/Floral Unit (Unit 8)

Appendix Q- Landscaping Unit (Unit 9)

Appendix R- Basic Water Resources Unit (Unit 10)

Appendix S- Advanced Water Resources Unit (Unit 11)

Appendix T- Agriculture Mechanics Technician Unit (Unit 12)

# Appendix A

## WORK CONTRACTS, CHILD LABOR LAWS, LIABILITY & INSURANCE

### WORK CONTRACTS

#### Education Training Agreement -

Students and employers participating in an approved youth apprenticeship program must have a **signed Education/Training Agreement (ETA) on file with both the school and the employer**. Employers without a valid ETA may be assessed (a) double compensation in the event of injury on the job, and/or (b) fines ranging from \$25 to \$1,000 for every day without a permit for a first offense to \$250 to \$5,000 for every day without a permit for a second offense within a five year period. The Local Youth Apprenticeship Coordinator will provide the employer with a copy of the ETA. This form is also available from the Department of Workforce Development at [http://dwd.wisconsin.gov/youthapprenticeship/forms\\_pubs.htm](http://dwd.wisconsin.gov/youthapprenticeship/forms_pubs.htm).

#### Work Permits -

A work permit is required for youth apprentices for work performed *outside* of this program. Employers without a valid work permit (if applicable) may be assessed (a) double compensation in the event of injury on the job, and/or (b) fines ranging from \$25 to \$1,000 for every day without a permit for a first offense to \$250 to \$5,000 for every day without a permit for a second offense within a five year period.

### CHILD LABOR LAWS

Youth apprentices enrolled in approved youth apprenticeship programs and their employers are subject to all state and federal child labor laws regarding the employment of minors. The Department of Workforce Development (DWD) will review all statewide youth apprenticeship curriculum for compliance with the child labor laws and will clarify the laws whenever necessary to allow for program implementation. Youth apprentices **are allowed** to work in **some prohibited** occupations because they meet the criteria of "**student learner**" **AND** the work performed is **incidental** to their training **and** is for **intermittent and for short periods of time** (Wis. Admin. Code DWD 270.14(3)(c)1 at ([http://docs.legis.wisconsin.gov/code/admin\\_code/dwd/270.pdf](http://docs.legis.wisconsin.gov/code/admin_code/dwd/270.pdf))). However, they are **not exempt** from the child labor laws by virtue of being enrolled in a youth apprenticeship program.

While DWD can interpret the law, DWD cannot exonerate employers from liability should an accident occur on the job which results in injury to an employee and a subsequent lawsuit. Determining liability for an accident can only be settled in a court

of law. DWD can assure employers that they will not be cited (by DWD) for illegally employing a minor in a prohibited occupation as long as the students are enrolled in a DWD approved youth apprenticeship program and a signed Education/Training Agreement is on file with both the student's high school and the employer. This means that employers will not be assessed treble fines should an injury occur which results in the employer being cited.

Readers should refer to DWD 270.12 and 270.14 [Child Labor Laws](https://dwd.wisconsin.gov/labor_standards_bureau/child_labor_law.htm) ([https://dwd.wisconsin.gov/labor\\_standards\\_bureau/child\\_labor\\_law.htm](https://dwd.wisconsin.gov/labor_standards_bureau/child_labor_law.htm)) and the [Guide to Wisconsin's Child Labor Laws](http://dwd.wisconsin.gov/dwd/publications/erd/pdf_erd_17231_p.pdf) ([http://dwd.wisconsin.gov/dwd/publications/erd/pdf\\_erd\\_17231\\_p.pdf](http://dwd.wisconsin.gov/dwd/publications/erd/pdf_erd_17231_p.pdf)) for descriptions and definitions of the occupations or activities which are normally prohibited to minors.

## **Agriculture-**

Youth apprentices who are 16-17 years old can perform the following tasks, *only after appropriate operation/safety training AND only as indicated below*. The **student learner exception** limits the minor to **using hazardous equipment** on an **incidental** basis [less than 5% of their work time] and only **occasionally** [can't be a regular part of their job]. For example, the student learner exception may apply in a situation, such as carpentry, where most of the work is acceptable but once in a while you might need the minor to use a portable saw to cut a piece to fit. Further interpretation or clarification of Child Labor Laws should be directed to the Department of Workforce Development (DWD) Labor Standards Bureau at 608-266-6860.

- **Agricultural Occupations\_ (DWD 270.13(6) and 29 CFR 570.71)**  
Minors under 16 are prohibited from performing several tasks pursuant to federal law, which state law incorporates). These tasks ARE allowed for student learners, as described above.
- **Agricultural Product Processing-**
- **MEAT PROCESSING (DWD 270.12(18))**  
Minors **cannot perform** the *following tasks*:
  - Tasks on the killing floor, in curing cellars, and in hide cellars, **except** the work of messengers, runners, hand-truckers, and similar occupations that require entering such workrooms or workplaces infrequently and for short periods of time.
  - Tasks involved in the recovery of lard and oils, **except** packaging and shipping of such products and the operation of lard-roll machines.
  - Tasks involved in tankage or rendering of dead animals, animal offal, animal fats, scrap meats, blood, and bones into stock feeds, tallow, inedible greases, fertilizer ingredients, and similar products.
  - Tasks involved in setting-up, adjusting, operating, repairing, oiling, feeding, or cleaning power-driven meat-processing machines, regardless of the product being processed:
  - Boning Occupations.

- Tasks that involve the pushing or dropping of any suspended carcass, half carcass, or quarter carcass.
  - Tasks involving hand-lifting or hand-carrying any carcass or half carcass of beef, pork, or horse, or any quarter carcass of beef or horse.
  - "*Boning occupations*" means the removal of bones from meat cuts. "Boning" does NOT include work that involves cutting, scrapping, or trimming meat from cuts containing bones.
  - "*Curing cellar*" includes a workroom or workplace that is primarily devoted to the preservation and flavoring of meat by curing materials. "Curing cellar" does NOT include a workroom or workplace where meats are smoked.
- **SECONDARY FOOD/FIBER PROCESSING**
    - The skills and competencies related to further processing food and fiber raw materials into products would be found under the Manufacturing Youth Apprenticeship program.
- **Animal Diagnostic Testing-** [\(DWD 270.12\(23\)\)](#)
    - Minors **cannot** take radiographs (x-rays).
- **Dehorning-**
    - Dehorning is not currently prohibited by Child Labor Laws.
- **Family Farms-** [\(DWD 270.15\)](#)
    - Normally, Child Labor Laws do not apply to farm work performed at the minor's own home farm; however, if the student is participating in a YA program on their family farm, child labor laws and wages do apply.
- **Motor Vehicle Driver and Outside Helper-** [\(DWD 270.12\(21\)\)](#)
    - Minors **under age 17 cannot drive** as part of their job. A minor, age 17, **may operate a motor vehicle** as a part of employment if:
      - the vehicle does not exceed 6,000 pounds gross weight;
      - driving is done during daylight hours only;
      - the driving amounts to no more than 20% of the work week or 1/3 of the work day;
      - the student has attended drivers' education training and holds a valid driver's license;
      - the driving takes place within a 30-mile radius of the minor's place of employment;
      - the minor has no record of any moving violations at the time of hire; and
      - the driving does not involve: towing of vehicles, route deliveries or sales, transportation for hire, urgent time-sensitive deliveries, transporting more than 3 passengers who are employees of employer at one time.

- **Pesticides-**
  - Pesticides can only be prepared, handled and applied by licensed professionals.
- **Tractors-** [\(DWD 270.13\(6\)\)](#)
  - No minor under the age of 16 years should operate a farm tractor or self-propelled implement of husbandry *on the highway* for their employer unless the minor has been certified as successfully completing a tractor and machinery operation safety training course. This certification is NOT required *to cross over the highway*.
- **Veterinary Services-**
  - In Veterinarian settings, observations, measurements, sample collections, and evaluations must be completed under the direct supervision of a licensed veterinarian or designated licensed veterinarian technician.
- **OTHER Possible Water Treatment Plant, Farm, Greenhouse, and Landscaping Tasks-**
- **CONFINED SPACE** [\(DWD 270.12\(7\)\)](#)
  - Minors **cannot** work in spaces that have limited openings for entry and egress, have unfavorable natural ventilation, or have dangerous air contaminants or produce dangerous air contaminants.
- **EXCAVATION OPERATIONS** [\(DWD 270.12\(9\) & 270.12\(7\)\)](#)
  - Minors **cannot perform** any of the following tasks in excavation operations:
    - Excavating, working in, or backfilling trenches, **except** manually excavating or manually backfilling trenches that do not exceed 4 feet in depth at any point, or working in trenches that do not exceed 4 feet in depth at any point.
    - Excavating for buildings or other structures or working in such excavations, **except** manually excavating to a depth not exceeding 4 feet below any ground surface adjoining the excavation, or working in an excavation not exceeding such depth, or working in an excavation where the side walls are shored or sloped to the angle of repose.
    - Working within tunnels prior to the completion of all driving and shoring operations.
    - Working within shafts prior to the completion of all sinking and shoring operations.
- **HOISTS AND HOISTING APPARATUS** [\(DWD 270.12\(12\)\)](#)
  - Students age 16 and 17 years old **cannot**:

- operate an elevator, crane, derrick, hoist or high-lift truck (including hoists commonly used on tow trucks and other hoists), **except** operating an unattended automatic operation passenger elevator or an electric or air-operated hoist not exceeding one-ton capacity;
  - perform work that involves riding on a man lift or on a freight elevator, **except** a freight elevator operated by an assigned operator;
  - assist in the operation of a crane, derrick or hoist performed by crane hookers, crane chasers, hookers-on, riggers, rigger helpers and like occupations.
  - Students under age 18 **may operate** an automatic elevator and an automatic signal operation elevator under certain conditions. Refer to DWD 270.12(12)(b) for exceptions and definitions of the terms used in this section.
  - Minors 16 and 17 years of age **may operate** floor jacks, hand jacks, drive-on lifts, and arm lifts used in conjunction with repairing or servicing motor vehicles. They may also use air compressors, tire changers, truck tire changers and wheel balancers as long as there are automatic safety features which lock vehicles to the lifts.
- ROOFING OR ON OR ABOUT A ROOF ([DWD 270.12\(24\)](#))
    - Minors **cannot perform** roofing operations or on or about a roof.
    - "*On or about a roof*" includes all work performed upon a roof, including carpentry and metal work, alterations, additions, maintenance and repair, including painting and coating of existing roofs; the construction of the sheathing or base of roofs; gutter and downspout work; the installation and servicing of heating, ventilation and air conditioning equipment or similar appliances attached to roofs; and any similar work that is required to be performed upon or about roofs.
- SAWS AND GUILLOTINE SHEARS USE ([DWD 270.12\(25\)](#))
    - Minors **cannot use** the following:
      - Power-driven fixed or portable machines, **except machines equipped with full automatic feed and ejection.**
      - Circular saws.
      - Band saws.
      - Guillotine shears.
      - Chain saws.
      - "*Machines equipped with full automatic feed and ejection*" means machines that are equipped with devices for full automatic feeding and ejection and with a fixed barrier guard to prevent completely the operator or helper from placing any part of his body in the point-of-operation area.
- WOODWORKING POWERDRIVEN MACHINES USE ([DWD 270.12\(27\)](#))
    - Minors **cannot operate** power-driven woodworking machines:

- Operator of power-driven woodworking machines, including supervising or controlling the operation of these machines, feeding material into these machines, and helping the operator to feed material into these machines **except** placing of material on a moving chain or in a hopper or slide for automatic feeding.
- Off-bearing from circular saws and from guillotine-action veneer clippers.
- "*Power-driven woodworking machines*" means all fixed or portable machines or tools driven by power and used or designed for cutting, shaping, forming, surfacing, nailing, stapling, wire stitching, fastening, or otherwise assembling, pressing, or printing wood or veneer.

### **Student Learner Criteria -**

In order to be considered a student learner, youth apprentices must meet the following criteria:

1. They are enrolled in a youth apprenticeship program approved by DWD;
2. They are enrolled in school and receiving school credit for program participation;
3. They receive appropriate safety instruction at the school and at the workplace;
4. The work performed is under direct and close supervision of a qualified and experienced person;
5. The ***work performed in any occupation declared hazardous*** is incidental to their training and is for intermittent and short periods of time ([DWD 270.14\(3\)\(c\)1](#)); and
6. There is a schedule of organized and progressive work processes to be performed on the job (i.e. the worksite is following the state curriculum).

### **Hours of Work -**

The hours an apprentice spends working in the program *during* the hours school is in session during the day **DO NOT COUNT** towards the limitation on total hours a minor may work. See the DWD [Child Labor](#) web site for applicable hours and times of the day that minors may work in Wisconsin.

### **LIABILITY AND INSURANCE**

As employees of the company, youth apprentices are covered by worker's compensation in the event of injury on the job. Employers should review their specific liability coverage to ensure there are no restrictions on employing minors and/or on coverage of minors operating particular machinery. Schools are not allowed to cover youth apprentices through their own workers' compensation policy while the youth apprentice is an employee of the local business.

As stated previously, DWD and/or local schools cannot exonerate employers from liability if a youth apprentice is injured on the job and a subsequent lawsuit is filed

against the employer. Determining liability for an accident can only be settled in a court of law and will be based on the specific circumstances for each case. It is important that a signed ETA be on kept on file by both the school and the employer to ensure that employers will not be cited for illegally employing a minor in a prohibited occupation.

### **General Liability –**

An employer is liable for the service provided at their facility. In general an employer has adequate general liability and workers compensation coverage, no additional liability is required as a result of the Youth Apprenticeship program. However, before participating in the program, an employer may wish to consult with their insurance carrier.

### **Transportation –**

In general, the party responsible for transportation is liable in case of an accident. Youth apprentices responsible for their own transportation to and from the worksite are responsible for their own insurance. In instances where the school provides transportation for the youth apprentices, the school is responsible for insurance coverage. Only if the facility provides transportation to and from work for the youth apprentice is the facility responsible for this insurance coverage.

### **Workers Compensation –**

Once a youth apprentice becomes a paid employee they must be covered by the employer's workers compensation coverage.

### **Unemployment Compensation –**

If a youth apprentice is enrolled full-time in a public educational institution and receives school credit for their participation in the YA program, then they are generally NOT eligible to file for unemployment compensation from the employer. Youth apprentices who do NOT meet these criteria may be eligible for unemployment compensation benefits.

### **Worker Displacement –**

No employer may hire a youth apprentice who will displace any currently employed worker, including a partial displacement, such as reduction in the hours of non-overtime work, wages, or employment benefits.

### **Layoffs/Strikes –**

A youth apprentice cannot be hired when any other individual is on temporary layoff, with the clear possibility of recall, from the same or equivalent job OR if the employer has terminated the employment of any regular employee, or otherwise reduced the workforce, with the intention of filling the vacancy created with a youth apprentice. Local bargaining units should determine the status of youth apprentices already working in the facility in the event of a layoff. Youth apprentices may be laid off or transferred to work areas to take the place of laid off workers. Child labor laws prohibit youth apprentices from working in a company where a strike or lockout is in active progress.

### **Collective Bargaining Agreements –**

The youth apprenticeship program should not impair existing contracts for services or collective bargaining agreements. Any youth apprenticeship program that would be inconsistent with the terms of a collective bargaining agreement shall be approved only with the written concurrence of the labor organization and employer involved.

# Appendix B

## Wisconsin Agriculture, Food and Natural Resources (AFNR) Youth Apprenticeship Implementation Guide for Employers

### BENEFITS TO THE EMPLOYER

Employment opportunities in the Agricultural, Food, and Natural Resources (AFNR) industry will continue to increase for those who provide and market an expanding array of food and veterinary products to a growing world population, as well as those managing the planet's natural resources. Continued globalization requires employees who understand how to satisfy diverse customer needs and preferences in multi-cultural production business settings. This diverse career area prepares learners for careers in the planning, implementation, production, management, processing and/or marketing of agricultural commodities and services including food, fiber, horticulture and other plant and animal products.<sup>3</sup>

The Agriculture, Food, and Natural Resources (AFNR) Youth Apprenticeship Program was designed with the needs of employers in mind. Employers across all industries have expressed concern that the education system has not adequately prepared young people with the work readiness and technical skills necessary to meet their business needs. This program was developed with the Wisconsin Technical College System and employer representatives from different AFNR industries to meet the needs of you, our AFNR employers.

By working with the AFNR Youth Apprenticeship Program you make an investment in the young people in your community. You will have access to a dependable recruitment pipeline of entry level workers that can be used to increase workforce diversity and provide supervisory opportunity for staff. You will be directly involved in the economic development efforts of your community as well as become a part of the creation of highly skilled workers, an excellent point in any public relations marketing.

A unique opportunity and added incentive for participation in the AFNR Youth Apprenticeship Program for both the employer and the student is that the competencies are aligned with the curriculum objectives from the Learning Libraries developed by the Center for Agricultural and Environmental Research and Training (<http://www.caert.net/>) and the national occupational skill standards recognized by the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) Standards in Agriculture, Food, and Natural Resources (AFNR), <http://www.careerclusters.org/>.

---

<sup>3</sup> Taken from the NASDCTEc Career Clusters Brochure for Agriculture, Food, & Natural Resources (2010)

Employers also play an active role in improving the quality of the future workforce by helping develop skill standards geared to employer needs, reducing employee turnover by hiring program graduates, supporting program graduates as they continue their education in post-secondary settings, raising the interest of other employees in education and training, and increasing the potential for teamwork and flexibility in work sharing. One employer noted, “This program is the single most effective use of taxpayer dollars to link our business community to the workforce and training needs of the community. We must expand, celebrate, promote and encourage participation in this endeavor. I have personally gained staff, changed some lives, and enjoyed the successes of the participants. It has enriched our staff in learning to operate as mentors, and enhanced our perception in the community as involved participants.”<sup>4</sup>

## **ROLE OF THE EMPLOYER**

The work-based learning component of the Youth Apprenticeship Program is the **primary** method for teaching the required competencies. The local business becomes an extension of the classroom for the youth apprentice. The related classroom instruction is intended to *support* the work-based learning experience by providing theoretical knowledge and, when needed, providing appropriate skill development. The work-based learning component is designed to provide an on-the-job learning environment for students by being “apprenticed” to an experienced mentor.

As an employer of a youth apprentice, you will be responsible for the following:

### **Student Selection**

Review employment applications, interview candidates, and select the student(s) they want to hire. New Employee Orientation is provided by you according to your facility’s Human Resources policies.

### **Wages**

Youth apprentices must receive minimum wage or higher. A pay schedule is agreed upon with the employer, local YA coordinator and the student. Most employers grant periodic raises dependent upon performance or length of employment.

### **Workers Compensation**

Once a youth apprentice becomes a paid employee they must be covered by the employer’s workers compensation coverage. Other benefits may be provided at the discretion of the employer.

### **Education/Training Agreement (ETA)**

---

<sup>4</sup> Kent Olson, YA Employer, Wausau, WI

Employers must sign and comply with the requirements in the ETA, and have a copy on file. (See *Appendix A “Work Contracts, Child Labor Laws, Liability & Insurance”* for more detail.)

### **Work Permits**

(See *Appendix A “Work Contracts, Child Labor Laws, Liability & Insurance”* for more detail.)

### **Child Labor Laws**

Employers must ensure that the work of any student at their worksite is allowed by Child Labor Laws and is under the direct and close supervision of a qualified and experienced person. Students must be provided with adequate safety training both in the school and at the worksite. All AFNR Youth Apprenticeship skill standards competencies have been reviewed by the Wisconsin Department of Workforce Developments Labor Standards Bureau and are in compliance with the child labor rules. (See *Appendix A “Work Contracts, Child Labor Laws, Liability & Insurance”* for more detail.)

### **Unemployment Compensation**

YA students are typically not eligible for unemployment compensation from the employer.

(See *Appendix A “Work Contracts, Child Labor Laws, Liability & Insurance”* for more detail.)

### **Job Performance**

Employers review, evaluate, and report on the youth apprentice's job performance approximately every nine weeks to ensure they are learning the required competencies. Mentors are expected to participate in progress reviews with the apprentice, school staff and/or Youth Apprenticeship instructors, and parent(s)/guardian(s).

### **Worksite Hours**

Employers must provide for the youth apprentice to meet the following work requirements:

- Youth Apprentices in a Level Two (2-year) program must complete a *minimum* of **900 hours** of work-based learning while they are enrolled in the program. At least 500 hours of the required minimum work-based learning hours must take place when related classes are being held, so that classroom instruction can be integrated with worksite learning.
- Youth apprentices in a Level One (1 year) program must complete a *minimum* of **450 hours** of work based learning while they are enrolled in the program. At least 250 hours of the required minimum work-based learning hours must take

place when related classes are being held, so that classroom instruction can be integrated with worksite learning.

- Youth apprentices may work *more* than the required minimum hours throughout the program.

### **Training to Competencies**

The employer is responsible for providing the worksite training required to meet the skills standard competencies specified in the applicable AFNR area. This requirement means that while the youth apprentice may be hired under one particular job function, he/she must be allowed to rotate and perform other functions in other departments to meet competencies even if some of them are not normally a part of that job function.

### **Mentors**

Employers assign worksite mentors to supervise and train youth apprentices. They also allow the mentors to attend special training classes provided by the local YA consortium to become successful mentors of high school apprentices. (See “Role of Mentors” below for more detail.)

### **Organized Labor**

Usually the AFNR Youth Apprenticeship is considered an educational activity rather than a job classification/position status. However, the youth apprenticeship program should not impair existing contracts for services or collective bargaining agreements. Any youth apprenticeship program that would be inconsistent with the terms of a collective bargaining agreement shall be approved only with the written concurrence of the labor organization and employer involved. If youth apprentices will be working in areas covered by labor agreements, organized labor must be involved to approve the program at the worksite. (See *Appendix A “Work Contracts, Child Labor Laws, Liability & Insurance”* for more detail.)

## **ROLE OF THE MENTOR**

Workplace mentors are one of the most critical elements which often determine the success of a youth apprenticeship. One mentor may work with more than one youth apprentice at a worksite, and the mentor may assign multiple “trainers” to instruct the youth apprentice while they rotate among various departments.

### **Effective Mentor Qualifications.**

- Experience working with adolescents either on the job, through family, or through outside activities
- Effective teaching/training skills with adults and/or youth

- Highly skilled in the area in which the youth apprentices will be trained
- Good communication skills in the workplace
- Knowledge of and commitment to the AFNR Youth Apprenticeship program

### **Mentor Responsibilities.**

- Develop a cooperative training schedule for the youth apprentice to ensure performance of the required work-based skills
- Work with instructors to coordinate the application of classroom learning objectives to the worksite
- Communicate regularly with the school, YA coordinator, and the instructor to ensure work-based learning objectives are being met
- Demonstrate tasks to youth apprentices and explain their importance
- Identify other trainers appropriate to train youth in the required competencies
- Evaluate the youth apprentice's progress on a regular basis and document achievements and skills
- Meet with the student, the student's parent(s)/guardian(s), and school staff and/or YA instructor at least once each grading period to review and update them on the student's progress
- Provide encouragement, support, and direction about the work site culture and skills
- Help the youth apprentice build self-confidence and self-esteem
- Be alert to personal problems that may affect the apprentice's work performance and guide them to seek help from appropriate sources
- Attend mentor training workshops and mentor meetings

Obtain additional resources for mentoring guidance from your local YA coordinator.

### **CHECKLIST FOR PROGRAM PARTICIPATION**

The following checklist will help you to participate in an AFNR Youth Apprenticeship (YA) Program.

- Discuss the AFNR YA program with the local partnership that offers Youth Apprenticeship Programs.
- Consult with the management team of your organization and union officials, if applicable.
- Obtain approval from appropriate organization officials to hire youth apprentices.
- Identify mentors and arrange for mentor training through your local YA Coordinator.
- Interview AFNR YA candidates for the program.
- Select youth apprentice(s).
- Sign Education/Training Agreement (ETA).
- Secure a Work Permit form.
- Orient your new youth apprentice to the workplace according to your organization's Human Resources policies.

## CHECKLIST FOR PROGRAM OPERATION

The following checklist will help ensure continued operation of the AFNR Youth Apprenticeship (YA) Program.

- Provide worksite training according to the AFNR Youth Apprenticeship Area curriculum.
- Participate in progress reviews with youth apprentices, school staff and/or YA instructors, and parents/guardians.
- Meet regularly with the youth apprentices to discuss their performance and any other issues.
- Employ youth apprentices during school breaks, either part-time or full-time.
- Participate in recognition events organized by the school for youth apprenticeship graduates.

## FREQUENTLY ASKED QUESTIONS

For questions not addressed here, do not hesitate to call your local youth apprenticeship coordinator or visit the [Department of Workforce Development Youth Apprenticeship \(http://ya.wi.gov\)](http://ya.wi.gov) website.

### ***How does this program differ from other work-based programs like coop education?***

Skilled Certified Coop Education and Youth Apprenticeship are similar in that they are both components of Wisconsin's overall school to work transition programs. An important difference, however, is that Youth Apprenticeship students are exposed to an occupational cluster versus a specific job. Additionally, the skills the student learns are developed in association with Wisconsin agricultural and natural resources employers, Wisconsin technical college faculty, YA consortium coordinators, and school district coordinators/instructors. The curriculum is standardized throughout the state.

### ***Will the mentor have to spend his/her entire time at work teaching the student?***

No. Apprentices need to be supervised, but you are not required to "shadow" them at all times. However, someone should be available for guidance as necessary. One mentor may work with more than one youth apprentice at a worksite, and the mentor may assign multiple "trainers" to instruct the youth apprentice while they rotate among various departments.

### ***Will the student do productive work?***

Yes. After appropriate training, youth apprentices can become productive employees of the facility. However, since they are often rotated through different departments they will require more training time than employees who stay in the same department. It is

important to remember that this is a training program. Upon completion of the probationary period, students are expected to meet the requirements of the position.

***Will there be a lot of paperwork for me to complete?***

Prior to the program, employers are required to sign the Education Training Agreement and maintain it. During the program, employers are expected to verify the youth apprentice's skills on the job and provide input during grading periods. Mentors must complete/maintain a simple "Skill Standards Checklist" as the student completes their competencies.

***What happens if I cannot provide all of the required competencies at my facility?***

In order to successfully complete the program and receive a Certificate of Occupational Proficiency, the youth apprentice must demonstrate proficiency in all areas required on the Skill Standards Checklist. If your facility does not provide the full range of services needed for competency mastery, the local youth apprenticeship coordinator may be able to arrange for the missing skills to be provided by another company. This arrangement should be discussed with the coordinator before you hire the youth apprentice.

***What costs will my business incur and will I be reimbursed?***

Primary costs to the employers are the wages paid to the youth apprentice and mentor during the training period.

***Will I have to treat the youth apprentice differently than my other employees?***

It is important to remember youth apprentices are placed in your facility to learn. Patience and guidance are required while they learn responsible work habits as well as the required skills. However, they are expected to follow your facility's work rules, e.g., dress code, behavior, discipline, etc., and to become a productive member of the AFNR team.

***What is the typical time frame for activities over the course of a youth apprentice's stay with a facility?***

Most program activities follow a one-year or two-year cycle depending on the offerings within your company. There may be variance in the timing of learning activities to accommodate local and seasonal needs including trainer availability.

# Appendix C

## RECOMMENDATIONS FOR RELATED TECHNICAL CLASSROOM INSTRUCTION FOR AGRICULTURE, FOOD AND NATURAL RESOURCES (AFNR) YA

These recommendations are intended to be used by the YA Consortia when determining appropriate related technical instruction for Agriculture, Food and Natural Resources (AFNR) YA. It is not all inclusive but should be used to assist the partnership with identification and/or development of course work that supports the work-based competencies as identified in the Skill Standards Checklist. As with all YA programs the consortium must ensure that the related instruction meets with the approval of their administration and school board.

### OPERATIONAL NOTES

- Related Technical Classroom Instruction may be offered by the employer, within the school district, at another school district, at a Wisconsin Technical College, and/or at a Community College or University by instructors qualified according to the [Youth Apprenticeship Program Operations Manual](http://dwd.wisconsin.gov/youthapprenticeship/pdf/program_operations_manual_2015.pdf) (YA POM) at [http://dwd.wisconsin.gov/youthapprenticeship/pdf/program\\_operations\\_manual\\_2015.pdf](http://dwd.wisconsin.gov/youthapprenticeship/pdf/program_operations_manual_2015.pdf).
- Learning Objectives are the foundation of related technical classroom instruction. Consortia may teach using locally developed coursework; however, it is recommended that agreements with the local technical college be pursued to obtain post-secondary credit for YA worksite and classroom experiences.
- A minimum of 180 hours (2 semesters) of related technical instruction is required for each one year YA program with 250 of the **work** hours coinciding with the instruction. The student must also receive high school credit towards graduation for this instruction, no matter the provider.
- It is suggested that the following courses or learning experiences be provided as a pre-requisite OR concurrently for students interested in this youth apprenticeship:
  - a. Introduction to Agriculture & Natural Resources Careers
  - b. Automotive Technologies
  - c. Biology
  - d. Business and Marketing
  - e. Chemistry
  - f. Environmental Science
  - g. Electrical Fundamentals
  - h. Farm Machinery

Additionally, students should complete a job shadow prior to enrollment in the AFNR YA program.

- If applicable and available at the worksite, efforts should be made with the employer to offer the student a continuing [Registered Apprenticeship](#) upon high school graduation. (See Registered Apprenticeship program information at [http://dwd.wisconsin.gov/apprenticeship/registered\\_apprenticeships.htm](http://dwd.wisconsin.gov/apprenticeship/registered_apprenticeships.htm).)
- Commercial programs or Employer provided classroom certification programs are also appropriate provided that the student receives high school credit towards graduation for the class work. A variety of courses are available locally and online. Programs that support the Future Farmers of America (FFA) Supervised Agricultural Experiences (SAE) (<https://www.ffa.org/about/supervised-agricultural-experiences>), or are based on the Center for Agricultural and Environmental Research and Training (CAERT) (<http://www.caert.net/>) and the iCEV on-line cloud based curriculum (<https://www.icevonline.com/>), Lesson Plan Libraries are appropriate for this YA program.
- A tractor safety course is **highly recommended** if students will be using tractors during the course of their worksite placement.
- Recommendations for this Appendix were obtained from Employers, the Wisconsin Department of Public Instruction, Wisconsin Technical College Faculty, YA Consortium/School District Coordinators during the Production Agriculture YA Survey, and through the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) recommendations at <http://www.careertech.org/>. Funded in part by the U.S. Department of Education.



## Agriculture, Food & Natural Resources (AFNR) Youth Apprenticeship (YA) Plan of Study

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

The Related Technical Instruction course selection and delivery are entirely within local consortium control. The recommendations listed below are only a suggested path of YA career planning and should be individualized to meet each learner's educational and career goals. All plans should meet high school graduation requirements, as well as, college entrance requirements as applicable.

### HIGHLY Recommended for ALL AFNR YA students

Educational Level	Grade	English/ Language Arts	Social Studies Social Sciences	Math	Science	Career Pathway Courses  (Electives)	Recommended Enhancement Electives or Activities
<b>Secondary</b>	<b>9</b>	Oral Communications (Speech)			Ag Science Biology	Computer Applications Principles of Agriculture and Natural Resources	FFA Skills USA Environmental Club
	<b>10</b>	Business Communications			Chemistry	Business and Marketing Concepts Computer Applications Simple Machines, Small Engines Welding Electrical Systems Automotive Technologies Mechanical Technology	FFA Skills USA Environmental Club Job-Shadowing
	<b>11</b>				Plant or Animal Science Environmental Science	<b>AFNR Youth Apprenticeship - Level One or Two</b> <ul style="list-style-type: none"> <li>• Employability Skills</li> <li>• Customer Service</li> <li>• Botany, Landscape Design, Greenhouse Management (YA Plants Pathway)</li> <li>• Large or Small Animal Science, Vet Science, Aquaculture (YA Animals Pathway)</li> <li>• Natural Resources, Environmental Science (YA Environmental Systems Pathway)</li> <li>• Food Science</li> <li>• Agriculture Mechanics Technician (YA Power, Structural and Technical Systems Pathway)</li> <li>• Agriculture Parts, Sales and Service (UA Power, Structural and Technical Systems Pathway)</li> </ul>	
	<b>12</b>		Economics		Biotechnology		

## Post-Secondary Occupational Opportunities

The chart below shows examples of career ladders organized by pathway.

For additional career cluster information, visit [www.careertech.org](http://www.careertech.org)

For additional career information on a specific occupation, visit <http://wicareerpathways.org/> or <http://worknet.wisconsin.gov/worknet/default.aspx>

		High School Diploma, On-the-Job Training	Certificate, Licensing, and/or Associate's Degree (1-2 years college)	Bachelor's/Master's Degree (4 year college)
		Agriculture, Food & Natural Resources (AFNR) Pathways	Plant Systems	General Farm Worker Grounds Worker Landscape Worker Nursery Worker Tree Trimmer
	Animal Systems	Farm Worker Vet Assistant	Animal Breeder Dairy Herd Manager Farm Labor Contractor Livestock Buyer Rancher Vet Technician	Animal Scientist Fish Hatchery Manager Livestock Geneticist USDA Inspector Veterinarian Wildlife Biologist
	Agribusiness Systems	Feed & Supply Store Clerk Greenhouse Salesperson	Agribusiness Specialist Agricultural Sales Feed Sales Representative	Agricultural Economist Agricultural Educator Agricultural Lender Farm Investment Manager
	Environmental Systems	Boiler Operator Plant Operator Water Treatment Technician Waste Water Operator (Registered Apprenticeship)	Calibration Technologist Field Service Technologist Instrumentation Technologist Plant Operator Water Quality Lab Technologist	Civil Engineer Environmental Engineer Hydrologist Plant Manager
	Power, Structural and Technical Systems	Agriculture Power and Equipment Sales Representative Agriculture Service Technician Derrick Operators Oil and Gas Electronic Motor, Power Tool & Related Repairers.	Agriculture Service Technician Agriculture Field Technician Precision Farming Specialist Parts & Service Department Manager Agriculture Power & Equipment Sales Representative Custom Harvesting Operator/Technician Agriculture Dealership Service Writer Aircraft Mechanics & Service Technicians	Agricultural Engineers Agriculture Sciences Teacher Electronics Engineers Engineering Technicians Precision Agriculture Technicians

SOURCES: National Association of State Directors of CTE Consortium, 2009 & 2013, [www.careertech.org](http://www.careertech.org); Wisconsin's Worknet, <http://worknet.wisconsin.gov/>; Milwaukee Water Council Career Map, 2012; Waukesha County Technical College (WCTC), Susan Maresh, Waukesha County School-to-Work, 2007.



# SAMPLE

## Agriculture, Food, and Natural Resources: Power, Structural and Technical Systems Career Pathway Plan of Study for ▶ Learners ▶ Parents ▶ Counselors ▶ Teachers/Faculty

This Career Pathway Plan of Study (based on the Power, Structural and Technical Systems Pathway of the Agriculture, Food and Natural Resources Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. \*This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.

EDUCATION LEVELS	GRADE	English/ Language Arts	Math	Science	Social Studies/ Sciences	Other Required Courses Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/or Degree Major Courses for Power, Structural and Technical Systems Pathway	SAMPLE Occupations Relating to This Pathway
<i>Interest Inventory Administered and Plan of Study Initiated for all Learners</i>								
SECONDARY	9	English/ Language Arts I	Algebra I	Earth or Environmental Science	State History Civics	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Supervised Agricultural Experience (SAE) and participation in appropriate FFA activities support and reinforce classroom and laboratory learning and should be a requirement for all students.	• Introduction to Agriculture, Food and Natural Resources	<b>Occupations Requiring Postsecondary Education</b> ▶ Communication Technician ▶ Database Administrator ▶ Electronic Systems Technician ▶ Equipment/Parts Manager ▶ GPS Technician ▶ Heavy Equipment Maintenance Technician ▶ Information Lab Specialist ▶ Machine Operator ▶ Machinist ▶ Recycling Technician ▶ Remote Sensing Specialist ▶ Welder
	10	English/ Language Arts II	Geometry	Biology	U.S. History		• Introduction to Power, Structural and Technical Systems	
	11	English/ Language Arts III	Algebra II or other math course	Physics or other science course	World History		• Structural Systems	
	<i>College Placement Assessments-Academic/Career Advisement Provided</i>							
	12	English/ Language Arts IV	Trigonometry or other math course	Chemistry or other science course		• Power Systems • Internship in Power, Structural and Technical Systems		
<i>Articulation/Dual Credit Transcribed-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.</i>								
POSTSECONDARY	Year 13	English Composition	Algebra	Physics Chemistry	American Government	All plans of study need to meet learners' career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	• Power, Structural and Technical Systems	<b>Occupations Requiring Baccalaureate Degree</b> ▶ Agricultural Applications Software Developer/Programmer ▶ Agricultural Educator ▶ Agricultural Engineer ▶ Waste Water Treatment Plant Operator
	Year 14	Speech/ Oral Communication	Calculus	Earth Science Biological Science	American History Geography		• Technical Systems • Advanced Applications of Technical Systems	
	Year 15	Technical Writing	Statistics		Political Science		• Continue Courses in the Area of Specialization	
	Year 16	Continue courses in the area of specialization.						

SOURCES: National Association of State Directors of CTE Consortium, [www.careertech.org](http://www.careertech.org)

# Appendix D

## WISCONSIN INSTRUCTIONAL DESIGN SYSTEM (WIDS) FORMAT AND YOUTH APPRENTICESHIP PROGRAM GUIDE TERMS

### WIDS/YA Program DOCUMENTS:

#### **Course Outcome Summary (COS)**

The overview summary of the Agriculture, Food & Natural Resources (AFNR) YA program listing the program units and their corresponding *competencies*.

#### **Agriculture, Food & Natural Resources (AFNR) YA Program Guide**

Description of the Agriculture, Food, & Natural Resources (AFNR) YA Program. The appendices contain program information; and competencies with their corresponding performance standards and learning objectives by unit. This is similar to the Program Outcome Summary (POS) in WIDS.

#### **Skill Standards Checklist**

Listing of ALL the competencies in ALL of the industry-wide and industry-specific skill areas. The checklist provides the overall documentation for DWD of the skill achievement levels for the competencies in the specific units.

### WIDS TERMS:

#### **Competency**

The major skill or outcome stated in observable, measurable terms telling learners what they must be **able to do** AFTER a learning experience.

#### **Performance Standards**

Specifications by which performance of a competency will be evaluated (criteria) and the circumstances/situation (condition) in which the competency will be evaluated. This is what the employer should look for when assessing the student's skills, as applicable to that worksite.

#### **Core Skills**

Competencies that address the abilities, values, and attitudes required for productive and successful employment.

#### **Learning Objective**

The background knowledge that is recommended in order for the student to master the competency. These objectives can direct learning in the related technical classroom instruction information that can be taught on-the-job, in a class, online, or through supplemental reading.

# Appendix E

## USE AND DISTRIBUTION OF THE CURRICULUM

**New and current employers** should be given at least one set of the complete curriculum package. The [curriculum package](http://dwd.wisconsin.gov/youthapprenticeship/afnr.htm) (<http://dwd.wisconsin.gov/youthapprenticeship/afnr.htm>) includes a copy of the Program Guide, Skill Standards Checklist, Unit Appendices, and the Course Outcome Summary (COS). In particular, the performance standards for each competency should be highlighted with the employer mentor(s) so that they know HOW to assess the learner for competency evaluation.

All related technical classroom **instructors** will need to be provided with the **Unit Appendices** in order to see the Learning Objectives for each competency for the related technical classroom instruction. The local Agriculture, Food & Natural Resources (AFNR) Youth Apprenticeship advisory group should determine the requirements and delivery of the required related technical classroom instruction **prior to** offering this YA program in the local consortium area. It is recommended that the advisory group ensure that the learning objectives are being taught either at the employer facility, school, and/or technical college.

At the beginning of the AFNR YA program, **student learners** should receive a copy of the [Skill Standards Checklist](http://dwd.wisconsin.gov/youthapprenticeship/afnr.htm) (<http://dwd.wisconsin.gov/youthapprenticeship/afnr.htm>) and the applicable pages from the **Unit Appendices** to review with their instructor(s) **and** worksite mentor(s). This is the opportunity for instructors and mentors to highlight the worksite experiences, related technical classroom instruction, and assessments that will occur. In a performance-based curriculum successful learning is enhanced when the learners have the opportunity to review what will be expected of them in advance of the lessons.

It is recommended that a portfolio be prepared for EACH learner. The learner should be given the responsibility for maintaining this documentation and making it available to the instructor and/or worksite mentor for recording performance assessments.

When the performance criteria are completed successfully, the learner achievement level information must be recorded on the [Skill Standards Checklist](http://dwd.wisconsin.gov/youthapprenticeship/afnr.htm). A copy of the completed Skill Standards Checklist is the piece of documentation required by DWD in order to issue the Certificate of Occupational Proficiency.

# Appendix F

## POST SECONDARY CREDITS

### **Wisconsin Technical College System**

Graduates of one-year or two-year Agriculture, Food & Natural Resource (AFNR) Youth Apprenticeship programs may be awarded credits in Wisconsin Technical College programs. Each Technical College may grant credit through specific local articulation agreements. Contact the local technical college to determine the number and type of articulated credits available for AFNR YA. The credits may be taken as technical college courses within Youth Apprenticeship programs or may be granted through advanced standing agreements when students enroll in the technical college.

In addition, YA students should request a credit evaluation of their YA classroom and work experiences upon admission to the local technical college under the “Credit for Prior Learning Policy” (#323) found in the Wisconsin Technical College System (WTCS) Policy Manual (<http://mywtcs.wtcsystem.edu/resources-policies/state-law-and-policy/wtcs-board-policy-manual>) and through the [WTCS-YA Credit Articulation Guidance Document](#) ([http://dwd.wisconsin.gov/youthapprenticeship/pdf/wtcs\\_ya\\_articulation\\_guidance\\_10\\_2010.pdf](http://dwd.wisconsin.gov/youthapprenticeship/pdf/wtcs_ya_articulation_guidance_10_2010.pdf)).

### **UW Institutions Credits for *Admission*** –

For information on Admission Credits for the Agriculture, Food & Natural Resources (AFNR) Youth Apprenticeship Program, see the following **UW>Help** web pages:

#### **Wisconsin's Youth Apprenticeship Program**

<http://uwhelp.wisconsin.edu/preparing/youth.aspx>

#### **Earning College Credit as a high school student**

<http://uwhelp.wisconsin.edu/admissions/special/highschool.aspx>

# Appendix G

## GRANDFATHER CLAUSE – PROGRAM TRANSITION GUIDELINES

### For **NEW** and **CONTINUING** Agriculture (Ag), Food & Natural Resources (AFNR) YA Students

- Starting in 2016-2017, all YA students will have the option of using the revised AFNR skill standards checklist.
- Starting in 2017-2018, all **new** YA students must use the revised AFNR skill standards checklist.
- Starting in 2018-19, all YA students must use the 2016 revised AFNR skill standards checklist.

**NOTE:** Additionally, Youth Apprenticeship students must maintain good academic standing and be on track for graduation to be eligible for a Certificate of Occupational Proficiency from the Department of Workforce Development.

# Appendix H

## AGRICULTURE, FOOD AND NATURAL RESOURCES YOUTH APPRENTICESHIP

### SKILL STANDARDS CHECKLIST

[\(Download most current\)](#)

[dwd.wisconsin.gov/youthapprenticeship/skills\\_checklists.htm](http://dwd.wisconsin.gov/youthapprenticeship/skills_checklists.htm)

Also see Appendix A for Child Labor Law guidance on equipment usage and restrictions.

# **Appendix I**

## **AGRICULTURE, FOOD & NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **COURSE OUTCOME SUMMARY: OVERVIEW AND TABLE OF CONTENTS**

# Agriculture, Food and Natural Resources (AFNR) Youth Apprenticeship Course Outcome Summary

## **Course Information**

<b>Organization</b>	Cooperative Educational Service Agency 6 (CESA 6)
<b>Developers</b>	Tania Kilpatrick
<b>Development Date</b>	2016

## **Description**

This curriculum describes the performance-based worksite Competencies, Performance Standards, and Learning Objectives for the Wisconsin Youth Apprenticeship (YA) Program in Agriculture, Food and Natural Resources (AFNR). The Wisconsin AFNR YA Program is designed to provide students with a working understanding of core industry skills and occupationally specific technical skills that serve as the standard for occupations in the AFNR industry. This program provides the framework for educators and industry to work together to produce work-ready, entry-level employees that will compete favorably in a global market, as well as, provide for post-secondary educational advancement while integrating work-based learning in the school and worksite.

The Agriculture, Food and Natural Resources (AFNR) competencies are aligned with the learning objectives in the Learning Libraries from the Center for Agricultural and Environmental Research and Training (<http://www.caert.net/>) and the standards and knowledge statements outlined in the National Association of State Directors of Career Technical Education Consortium (NASDCTEc) Standards (<http://www.careerclusters.org/>) in four of the seven AFNR Pathways; Animal Systems, Environmental Systems, Plant Systems, and Power, Structural & Technical Systems. AFNR YA students are required to perform all of the Core and Safety skills for the pathway they enroll in. **Level One (one year)** AFNR YA students are also required to complete additional competencies in the applicable Pathway Basics Unit. **Level Two (two year)** AFNR YA students are to choose another specific unit, Large Animal/Herd, Small Animal/Vet Assistant, Crops, Greenhouse/Floral, Landscaping, Advanced Water Resources, or Agriculture Mechanics Technician based on their pathway, area of interest, and their worksite placement.

**EACH competency** (work site skill) is listed with its corresponding Performance Standards and Learning Objectives in the Appendices. The Performance Standards describe the behaviors, **as applicable**, that employers should look for in order to evaluate the competency. The Learning Objectives describe the classroom learning content recommended for the required related technical instruction.

## Curriculum Sources

- Business and Industry Curriculum Advisory meetings for AFNR Power, Structural and Technical Systems: 11/13/2015, 12/18/2015, and 03/11/2016. Facilitated by Tania Kilpatrick.
- California K12 Agriculture and Natural Resource Standards, May 2005, for Agricultural Business, Agricultural Mechanics, Agriscience, Animal Science, Ornamental Horticulture, and Plant & Soil Science. <http://www.cde.ca.gov/ci/ct/sf/documents/ctestandards.pdf>. Accessed July 2009.
- Center for Agricultural and Environmental Research and Training (CAERT) Learning Libraries for Agribusiness, Animal, Plant, & Soil Science, Environmental Resources, Agricultural Mechanics & Technology, and Horticulture. <http://www.caert.net/>. Accessed September 2009 – May 2010. [Note: CAERT requires password – do we still want/need to list?]
- Dane County YA Consortium meeting with Agricultural professionals regarding YA students and Vet/Small Animal and Horticulture/Greenhouse curriculum. Meeting November 5, 2009.
- DACUM (Developing a Curriculum) Advisory Board Meeting for Water Resources 11/27/2012. Facilitated by Robin Kroyer-Kubicek, conducted at Milwaukee Area Technical College.
- Gateway Technical College (2010) Course Outcome Summary for Fresh Water Treatment (607-183), Watershed Hydrology & Conservation (607-181), Sampling & Testing (607-182), and Waste Water Treatment (607-185).
- Green Bay Metropolitan Sewerage District pilot YA program in Wastewater Management developed 2012.
- Illinois Occupational Skill Standards for Row Crop Production, Beef Production, Swine Production, Agricultural Mechanics. <http://eric.ed.gov/?id=ED448356>. Accessed July 2009.
- Madison Technical College Course Outcome Summary for Lab Animal Caretaker, 2008.
- Madison Technical College Veterinary Faculty staff meeting. Meeting October 26, 2009.
- Manitowoc Public Utility, Water Operator Training Syllabus, November 2012.
- Milwaukee Area Technical College, Horticulture Advisory Committee meeting. Meeting November 10, 2009.
- Milwaukee Area Technical College, Ornamental Plant Health Care, 001-113, July 15, 2009.
- Milwaukee Water Council, Lead to Succeed “Water 101” Curriculum Resource Guide, October 2012.
- National Association of State Directors of Career Technical Education Consortium (NASDCTEc) Career Clusters, Agriculture, Food, and Natural Resources Career Cluster Knowledge and Skills charts for Animal Systems, Plant Systems, and Agribusiness Systems. <http://www.careerclusters.org/>. Accessed July 2009 and August 2012.
- National Council for Agricultural Education, National Agricultural, Food, and Natural Resources (AFNR) Career Cluster Standards, 2009.
- Ohio State University, Center of Education and Training for Employment, DACUM for Greenhouse Growers (2002), Crop Rotation Systems, Dairy, Livestock & Field Crops (2003), and Goat Production (2007).
- Oklahoma Career Tech Skills Standards and Assessment for Agricultural Core Education (2007), Veterinary Assistant (2004), and Animal Science Animal Production Assistant (2006).
- Texas State Technical College- Waco, DACUM for Horticulture and Landscaping Technician, January 2002.
- U.S. Department of Labor Water Sector Competency Model. [www.doleta.gov](http://www.doleta.gov). Accessed July 2012.

- Wisconsin Department of Agriculture, Trade, and Consumer Protection Agricultural Education and Workforce Development Council meeting. Meeting October 29, 2009.
- Wisconsin Administrative Code, Department of Workforce Development, Chapter 270, Child Labor, and Wisconsin State Statutes Chapter 106, Apprentice, Employment and Equal Rights Program, June 2, 2007, and Chapter VE1, VE7-9 Veterinary Examining Board statutes, 2009.
- Wisconsin Department of Natural Resources, Introduction to Preliminary & Primary Treatment Study Guide (August 1991) and Introduction to General Wastewater Study Guide (December 2011).
- Wisconsin Department of Regulation and Licensing, Veterinary Technician Credentialing, 2009.
- Wisconsin Department of Public Instruction, Model Academic Standards for Agricultural Education, May 2013. [http://dpi.wi.gov/sites/default/files/imce/cte/pdf/ag\\_standards.pdf](http://dpi.wi.gov/sites/default/files/imce/cte/pdf/ag_standards.pdf).
- Wisconsin Department of Public Instruction, Skill Standards Co-op for Agribusiness – Animal and Plant Science. September 2009.
- Wisconsin Department of Workforce Development, AFNR Youth Apprenticeship Advisory Committee, formed September 2009 for the purpose of revising and updating the Production Agriculture Youth Apprenticeship curriculum.
- Wisconsin Department of Workforce Development, Water Resources Youth Apprenticeship Advisory Committee, formed September 2012 for the purpose of adding a Water Resources pathway to the AFNR Youth Apprenticeship curriculum.
- Wisconsin Department of Workforce Development Production Agriculture Youth Apprenticeship Survey dated July 2009, and the subsequent Advisory Committee, formed September 2009 for the purpose of revising and updating the Youth Apprenticeship curriculums.
- Wisconsin Department of Workforce Development, Production Agriculture- Animals and Production Agriculture- Soils and Crops Youth Apprenticeship curriculum dated June 2006.
- Wisconsin Department of Workforce Development, Bureau of Apprenticeship Standards for Registered Apprenticeship in Wastewater Treatment Plant Operator April 2012.
- Wisconsin Technical System Course Outcome Summary for Animal Science (10-006-1, 2005), Agribusiness Sales & Marketing (2003), Introduction to Horticulture (2003), Introductory Soils (2005), Farm Business Management Planning (1999), and Livestock & Dairy Operations Management.
- Worknet Occupation Task Lists for Animal Breeder, Farm Worker- Farm & Ranch Animals, General Farm Workers, Landscaping and Grounds-keeping Workers, Nursery Workers, Tree Trimmers and Pruners, and Veterinary Technologists & Technicians, Environmental Engineering Technicians, Hydrologists, Wastewater Treatment Plant Operators, and Farm Equipment Mechanics and Service Technicians. <http://worknet.wisconsin.gov/worknet/default.aspx>. Accessed December 2009, July 2012, and August 2016.

*The initial AFNR curriculum was developed through a Grant from the Wisconsin Department of Workforce Development to the University of Wisconsin-Oshkosh's Center for Career Development and Employability Training (CCDET)*

*Furthermore, parts of this product were funded by an additional grant awarded under the Workforce Innovation in Regional Economic Development (WIRED) Initiative as implemented by the U.S. Department of Labor's Employment & Training Administration. All references to non-governmental companies or organizations, their services, products, or resources are offered for informational purposes and should not be construed as an endorsement by the Department of Labor. This product is copyrighted by the institution that created it and is intended for individual organizational, non-commercial use only.*

*In 2012, the curriculum was revised to add the Water Resources Unit, and then in 2016 the curriculum was again revised to add the Agriculture Mechanics Technician unit. All of these curriculum revisions were done through grants from the Wisconsin Department of Workforce Development to the Cooperative Educational Service Agency 6 (CESA 6).*

## Table of Contents

### APPENDIX J: Required Skills

#### Unit 1: Core Skills

1. Apply academic knowledge
2. Apply career knowledge
3. Apply Agriculture, Food, and Natural Resources industry knowledge
4. Communicate effectively
5. Act professionally
6. Demonstrate customer service skills
7. Cooperate with others in a team setting
8. Think critically
9. Exhibit regulatory and ethical responsibilities
10. Use resources wisely
11. Use basic technology

#### Unit 2: Safety

1. Follow personal safety requirements
2. Maintain a safe work environment
3. Demonstrate professional role to be used in an emergency

### APPENDIX K:

#### Unit 3: Animal Pathway: Animal Basics Unit

1. Clean and maintain animal quarters
2. Safely handle animals
3. Mix feed, additives and/or medicines
4. Manage animal waste
5. Observe and measure animal physical characteristics
6. Assist to examine animals
7. Collect samples for testing and/or food production
8. Maintain animal care and business records
9. Manage inventory
10. Evaluate the facility business and marketing plan

### APPENDIX L:

#### Unit 4: Animal Pathway: Large Animal/Herd Unit

1. Clean and groom animals
2. Feed and water animals
3. Mark or tag animals
4. Herd and/or patrol/monitor animals
5. Monitor animal food and water supplies
6. Assist to optimize animal performance and production
7. Collect and process animal products and by-products
8. Assist with reproductive selection
9. Assist with reproductive breeding and/or birthing
10. Assist to prevent the spread of animal diseases

11. Operate equipment & machinery safely
12. Clean and service equipment & machinery
13. Maintain facilities

#### **APPENDIX M:**

### **Unit 5: Animal Pathway: Small Animal/Vet Assistant Unit**

1. Manage clinic or research appointments
2. Set up area for animal exams & procedures
3. Clean & sterilize equipment
4. Maintain & QC diagnostic equipment
5. Assist to collect diagnostic samples
6. Run basic diagnostic tests
7. Assist to administer routine treatments, vaccines, and medications
8. Assist to prepare animals for surgery
9. Monitor animal responses to non-surgical procedures
10. Service customers and/or collect fees
11. Assist with animal euthanasia

#### **APPENDIX N:**

### **Unit 6: Plants Pathway: Plant Basics Unit**

1. Prepare planting spaces
2. Prepare soils/media
3. Plant seeds, seedlings, or cuttings
4. Monitor plants for light, moisture, and temperature requirements
5. Assist to install and maintain watering and/or irrigation systems
6. Mix fertilizers and additives
7. Apply fertilizers
8. Manage inventory
9. Maintain agribusiness records
10. Evaluate the facility business and marketing plan

#### **APPENDIX O:**

### **Unit 7: Plants Pathway: Crops Unit**

1. Assist to plan crop from rotation schedule
2. Till and test the soil
3. Plant crops
4. Assist to maintain and monitor crops
5. Assist to prevent the spread of weeds, pests, and diseases
6. Harvest crop product
7. Assist to transport and unload crop
8. Inspect, sort, and store product
9. Operate crop equipment & machinery safely
10. Clean and service equipment & machinery

#### **APPENDIX P:**

### **Unit 8: Plants Pathway: Greenhouse/Floral Unit**

1. Service customers
2. Process sales
3. Assist to design crop plantings, displays, and/or floral arrangements

4. Implement crop planting plan
5. Assist to maintain and monitor crop plantings
6. Assist to prevent the spread of weeds, pests, and diseases
7. Perform sanitization procedures
8. Prepare, sort, and store products
9. Fill and package orders
10. Load product for sale, delivery, or further distribution
11. Assist to maintain facility & equipment
12. Sharpen hand tools

**APPENDIX Q:**

**Unit 9: Plants Pathway: Landscaping Unit**

1. Assist to evaluate landscaping site
2. Measure and prepare landscaping site
3. Test soil
4. Assist to create design
5. Prepare supplies and equipment
6. Remove waste materials and hardscaping
7. Install construction materials and hardscaping
8. Plant landscaping materials
9. Maintain landscaped spaces
10. Operate landscaping machinery safely
11. Assist to maintain landscaping facility & equipment
12. Sharpen hand tools

**APPENDIX R:**

**Unit 10: Environmental Systems Pathway: Basic Water Resources Unit**

1. Apply water industry knowledge
2. Read technical drawings & work orders
3. Monitor operating conditions, meters, & gauges
4. Collect operational data
5. Use operations software (SCADA, PLC, GIS/GPS, DBs)
6. Adjust basic operating conditions based on readings
7. Clean & maintain facility, tanks, filter beds, etc.
8. Treat &/or dispose of solids/sludge/scale
9. Clean & maintain lab equipment
10. Collect & store samples
11. Preserve chain of custody
12. Weigh & measure accurately
13. Perform calculations & conversions
14. Conduct basic lab testing
15. Operate tools & equipment safely
16. Monitor pumps & equipment for correct operation

**APPENDIX S:**

**Unit 11: Environmental Systems Pathway: Advanced Water Resources Unit**

1. Assist with reporting

2. Assist to evaluate security & public health operations
3. Assist with required inspections/audits
4. Assist to prepare chemicals
5. Assist to add chemical
6. Perform start-up & shut-down of pumps & equipment
7. Inspect operational equipment
8. Assist to troubleshoot operations
9. Prepare microscope slides
10. Operate a microscope
11. Identify microbes
12. Assist to analyze lab results
13. Maintain schedules, communication, & documentation
14. Perform preventive maintenance (PM)
15. Calibrate equipment
16. Assist to troubleshoot & repair equipment
17. Assist to analyze operational data for productivity/trends
18. Assist to record, summarize, & evaluate budget/usage/billing information
19. Participate in a system project

**APPENDIX T:**

**Unit 12: Power, Structural & Technical Systems Pathway: Agriculture  
Mechanics Technician Unit**

**Competency:**

1. Select correct hand tools and light duty power tools require for job
2. Demonstrate safe operation of hand tools, light duty power tools and stationary tools
3. Clean, organize and maintain work environment
4. Identify and demonstrate correct use of fasteners
5. Handle and store oils, grease, chemicals, cleaners, solvents, etc., according to the Materials Data Safety Data Sheet (M)SDS
6. Assist with proper engine, testing and maintenance
7. Demonstrate safe practices and procedures in the operation, maintenance and repair of engines and equipment
8. Assist in the pre-inspection of equipment components
9. Assist with the setup of equipment and machinery
10. Connect software to equipment and retrieve diagnostic trouble
11. Check fluid levels and lubricate machinery and equipment according to manufacturer specifications
12. Maintain vehicle and machinery appearance and cleanliness prior to inspection delivery
13. Prepare and complete written documentation of work performed and parts used
14. Look up parts
15. Demonstrate proper use of specific diagnostic tools
16. Weld and cut metal using an oxyacetylene torch and plasma arc torch
17. Read and interpret hydraulic symbols and flow on a schematic drawing
18. Apply basic knowledge of hydraulics to service maintenance
19. Assist with inspection and diagnosis of hydraulic components
20. Assist with the maintenance and repair of system components
21. Interpret electrical symbols and wiring schematics
22. Apply basic electrical theory
23. Assist with repair of failed components and/or repair wiring

- 24.** Assist with inspection and diagnosis of electrical/electronic components
- 25.** Assist with the maintenance and repair of electrical/electronic components
- 26.** Assist with troubleshooting and installation of instrumentation and data acquisition system (e.g., Global Positioning System (GPS), spraying, planting, harvesting monitors, etc.)
- 27.** Assist to dismantle defective machines and equipment
- 28.** Assist with reassembly of machines and equipment
- 29.** Assist with calibration, metering, monitoring and sensing equipment

# **Appendix J**

## **AGRICULTURE, FOOD AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **REQUIRED SKILLS CURRICULUM UNITS 1-2**

## Core Abilities

Competency (Work Tasks)	Performance Standards What employer checks for while doing task. <b>Train YA Student on.</b> YA student will...	Learning Objectives What to know/learn to do this task. <b>Content Suggested</b> for Class/Reading/On-the-Job Training.
<b>1. Apply academic knowledge</b>	<ul style="list-style-type: none"> <li>• Read and comprehend work related materials</li> <li>• Apply mathematical operations involving whole numbers, fractions, decimals, percentages, formulas and methods of measurement accurately when necessary</li> <li>• Interpret charts, tables, and graphs</li> </ul>	<p>MATH</p> <ul style="list-style-type: none"> <li>• Add, subtract, multiply, and divide whole numbers, fractions, decimals and percents</li> <li>• Calculate averages, ratios, proportions, and rates</li> <li>• Convert decimals to fractions, fractions to percents and vice versa</li> <li>• Measure and accurately report measurements of time, temperature, length, width, height, width, perimeter, area, volume, and weight</li> <li>• Use appropriate formulas</li> <li>• Convert measurements correctly (e.g., English (standard) to metric)</li> <li>• Interpret meaning from data</li> </ul> <p>ENGLISH</p> <ul style="list-style-type: none"> <li>• Use standard English to compile information and prepare written reports</li> <li>• Apply English language correctly (spelling, grammar, structure)</li> <li>• Derive meaning from text through summarizing</li> <li>• Discern meaning from written word</li> <li>• Use acceptable language</li> <li>• Write legibly</li> </ul> <p>SCIENCE</p> <ul style="list-style-type: none"> <li>• Explain the key elements of the scientific process</li> <li>• Define the differences in qualitative and quantitative measurements</li> <li>• Compare and contrast subjective and objective information</li> <li>• Discriminate between fact and opinion</li> </ul>
<b>2. Apply career knowledge</b>	<ul style="list-style-type: none"> <li>• Demonstrate understanding of career development in the Agriculture, Food, and Natural Resources industry</li> <li>• Obtain necessary skills and knowledge to meet position requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the process for seeking employment</li> <li>• Describe the major functions and duties of the career pathways within the agriculture, food, and natural resources career cluster</li> <li>• Discuss educational, training, and credentialing requirements for a selected job</li> </ul>

		<ul style="list-style-type: none"> <li>• Research job requirements and characteristics of a selected job</li> <li>• Contrast "positive" and "less positive" aspects of a selected job</li> <li>• Describe opportunities for advanced training in agriculture, food, and natural resources careers</li> <li>• Describe professional organizations and publications in your career interest industry and how they can help develop leadership skills, personal growth, and career success</li> </ul>
<p><b>3. Apply Agriculture, Food &amp; Natural Resources industry knowledge</b></p>	<ul style="list-style-type: none"> <li>• Demonstrate Agriculture, Food, and Natural Resources systems understanding based on current knowledge and training</li> </ul>	<p>SYSTEMS, PRINCIPLES, CONCEPTS</p> <ul style="list-style-type: none"> <li>• Define agriculture and environment</li> <li>• Describe the various components of the agriculture and the natural resources industry</li> <li>• Explain the importance of the agriculture and natural resources industry in meeting human needs</li> <li>• Identify agricultural and natural resources products</li> <li>• Discuss the role of nutrients and nutrition in plant growth and animal production</li> <li>• Identify classes of natural resources</li> </ul> <p>HISTORY &amp; TRENDS</p> <ul style="list-style-type: none"> <li>• Report on historical evolution of agriculture and natural resource management in the US and globally</li> <li>• Identify significant issues that impact agriculture, food, and natural resources locally and globally</li> </ul> <p>ROLE &amp; IMPACT</p> <ul style="list-style-type: none"> <li>• Understand each segment's role in the food supply continuum</li> <li>• Determine the scope and the economic impact of the agriculture and natural resource industry at the local, state, national, and international levels</li> <li>• Determine the importance of the agriculture and natural resource industry to society at the local, state, national, and international levels</li> <li>• Examine economic, social and technological changes to the agriculture and natural resource industry</li> <li>• Explain technological changes and their impact on agriculture and natural resource management</li> <li>• Identify and discuss use of new technologies (such as lasers and robotics) and their impact on agricultural and natural resource systems</li> <li>• Discuss the importance of new communication systems and how they impact systems</li> </ul>

		<ul style="list-style-type: none"> <li>• Discuss the role of biotechnology in the agriculture and natural resource industry</li> </ul>
<b>4. Communicate effectively</b>	<ul style="list-style-type: none"> <li>• Deliver coherent verbal messages in words that can be understood</li> <li>• Use appropriate and bias-free language</li> <li>• Use appropriate body language</li> <li>• Listen actively to others</li> <li>• Demonstrate courtesy with self-introduction</li> <li>• Respond to inquiries or statements within the scope of current responsibilities and understanding</li> <li>• Does not provide confidential information without appropriate authorization</li> <li>• Does not overreact in response to anger</li> <li>• Record information in a timely manner</li> <li>• Record written information legibly and accurately</li> <li>• Organize and compile messages, technical information, and summaries accurately</li> <li>• Use instant messaging, email, the Internet, printer, copier, scanner, and fax machine equipment appropriately as applicable</li> <li>• Is sensitive to special, multicultural, and/or multilingual needs</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss the role of biotechnology in the agriculture and natural resource industry</li> </ul> <p>GENERAL</p> <ul style="list-style-type: none"> <li>• Compare verbal and nonverbal behaviors</li> <li>• Explain how empathy and bias can be communicated verbally and non-verbally</li> </ul> <p>LISTEN</p> <ul style="list-style-type: none"> <li>• Discuss effective and active listening skills</li> <li>• Differentiate between hearing and listening</li> </ul> <p>WRITTEN</p> <ul style="list-style-type: none"> <li>• Discern meaning from written instructions</li> <li>• Write clearly to communicate written ideas</li> <li>• Discuss common recording errors and how to avoid them</li> </ul> <p>CUSTOMER</p> <ul style="list-style-type: none"> <li>• Identify internal and external customers at your facility</li> <li>• Discuss steps to assess customer understanding</li> <li>• Describe the steps to follow when dealing with complaints</li> </ul> <p>TOOLS</p> <ul style="list-style-type: none"> <li>• Describe technology used in communicating such as, telephone, texting, instant messaging (IM), computers, fax, intercom, beepers, tube systems, etc.</li> <li>• Explain the proper use and etiquette required for these forms of communication technology</li> <li>• Review the policies and procedures for using written communication tools in your company such as IM, email, Internet, printer, copier, scanner, and/or fax</li> </ul>
<b>5. Act professionally</b>	<ul style="list-style-type: none"> <li>• Follow oral and written instructions</li> <li>• Is pleasant, courteous, and professional with coworkers and internal and external customers</li> <li>• Appearance and dress are appropriate according to the requirements of the employer</li> <li>• Takes personal responsibility for attendance</li> <li>• Is punctual</li> <li>• Begin work promptly</li> <li>• Organize and prioritize tasks efficiently</li> <li>• Exhibit positive attitude and commitment to task at hand</li> <li>• Complete assigned tasks accurately and in a timely manner</li> </ul>	<ul style="list-style-type: none"> <li>• Locate and explain written organizational policies, rules and procedures to help employees perform their jobs</li> <li>• Locate and explain your company's employee manual for policies on Appearance, Breaks, Time Off, Cell Phone Use, Weather, Personal Issues, etc.</li> <li>• List qualities of successful Agriculture, Food, and Natural Resources employees</li> <li>• Describe how you can demonstrate enthusiasm and commitment at the worksite</li> <li>• Define initiative</li> <li>• Explain ways that you can show initiative at a worksite</li> <li>• Explain methods to evaluate work assignments and</li> </ul>

	<ul style="list-style-type: none"> <li>• Take responsibility for actions and decisions</li> <li>• Recognize lack of knowledge and seek help from information sources</li> <li>• Evaluate work goals periodically with worksite professional</li> <li>• Accept constructive criticism and applies suggestions</li> <li>• Communicate safety, training, and job-specific needs</li> <li>• Adhere to safety rules and regulations</li> </ul>	<p>prioritize them</p> <ul style="list-style-type: none"> <li>• Describe how to effectively receive feedback</li> </ul>
<b>6. Demonstrate customer service skills</b>	<ul style="list-style-type: none"> <li>• Is knowledgeable about products and services</li> <li>• Address the customer, either in person, by telephone, e-mail or other means</li> <li>• Gather information about customer's needs, and customer's knowledge of products or services</li> <li>• Respond to customer's comments and questions</li> <li>• Solicit supervisor or co-worker support and advice when necessary to meet customer needs</li> <li>• Coordinate as needed with other services to expedite delivery of service or product</li> <li>• Handle complaints tactfully without insult or conflict</li> </ul>	<ul style="list-style-type: none"> <li>• Define customer service</li> <li>• Identify internal and external customers at your facility</li> <li>• Describe how customer service affects a company's "bottom line"</li> <li>• Describe standards of service</li> <li>• List strategies for maximizing customer satisfaction</li> <li>• Describe the functions of other departments or units to serve the customer</li> <li>• Describe the steps to follow when dealing with complaints</li> <li>• Identify customer service methods to use when encountering an angry customer</li> <li>• Review material pertaining to products and services produced by your department or company</li> </ul>
<b>7. Cooperate with others in a team setting</b>	<ul style="list-style-type: none"> <li>• Demonstrate respect relating to people</li> <li>• Contribute to a group with ideas, suggestions, and effort</li> <li>• Listen and respond appropriately to team member contributions</li> <li>• Work collaboratively with people from other backgrounds/cultures</li> <li>• Resolve differences for the benefit of the team</li> <li>• Complete their share of tasks necessary to complete a project</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the functions of each department or unit within the larger organization</li> <li>• Identify roles found in teams such as leader, facilitator, recorder, etc.</li> <li>• List effective meeting management skills</li> <li>• Demonstrate techniques that show respect for others</li> <li>• Describe how to effectively give and receive feedback</li> <li>• Describe conflict resolution methods</li> <li>• Discuss ways to participate within a team setting</li> <li>• Explain how to interact appropriately with diverse ethnic, age, cultural, religious, and economic groups in different situations</li> <li>• Describe how work teams coordinate work flow and help manage resources</li> </ul>
<b>8. Think critically</b>	<ul style="list-style-type: none"> <li>• Recognize the existence of a problem</li> <li>• Apply problem-solving steps</li> <li>• Differentiate between fact and opinion</li> <li>• Consider other viewpoints and perspectives</li> </ul>	<ul style="list-style-type: none"> <li>• Describe how to break a problem down in order to brainstorm, evaluate, and analyze possible solutions</li> <li>• Discuss the difference between fact and opinion</li> <li>• Discuss data collection techniques for the problem</li> </ul>

	<ul style="list-style-type: none"> <li>• Apply the principles and strategies of organized thinking</li> <li>• Evaluate information, ideas, and problems</li> <li>• Collect information through probing questions and research</li> <li>• Define the problem</li> <li>• Use techniques such as brainstorming to acquire alternative solutions</li> <li>• Demonstrate comparison skills</li> <li>• Make decisions based on analysis</li> <li>• Present ideas for critical evaluation</li> <li>• Support viewpoints with evidence</li> <li>• Respond to problems with the appropriate level of urgency</li> </ul>	<p>solving process</p> <ul style="list-style-type: none"> <li>• Describe how to present a solution with evidence</li> <li>• Explain ways to reach a decision by consensus</li> <li>• Discuss methods to evaluate a solution that has been implemented</li> </ul>
<p><b>9. Exhibit regulatory &amp; ethical responsibility</b></p>	<ul style="list-style-type: none"> <li>• Follow all safety and worksite standards and regulations</li> <li>• Perform legally and ethically by all local, state, and national standards</li> <li>• Use instant messaging, email, the Internet, printer, copier, scanner, and fax machine equipment appropriately and correctly as applicable</li> <li>• Operate within scope of authority adhering to company rules, regulations, and policies as established in employee handbook/procedures</li> <li>• Comply with legal requirements for documentation</li> <li>• Document work processes as required</li> <li>• Record and file appropriate documents in timely manner</li> <li>• Maintain confidentiality of company, customer, and co-worker information</li> <li>• Document reportable incidents to worksite professional immediately, if applicable</li> <li>• Receive, handle, package, and ship materials and product according to shipping laws and regulations if applicable</li> </ul>	<p>GENERAL</p> <ul style="list-style-type: none"> <li>• Explain the role of the government in regulating and managing the agriculture and natural resources industry</li> <li>• Compare national, state and local regulators that oversee agriculture and natural resources industry</li> <li>• Compare the following Federal regulatory agencies and their laws on the agriculture and natural resource industry: U.S. Department of Agriculture (USDA), the U.S. Department of the Interior (DOI), the Environmental Protection Agency (EPA), and the Food and Drug Administration (FDA)</li> <li>• Identify the management structure and employees' roles within your organization</li> <li>• Describe common legal requirements that must be met in agriculture and natural resources facilities</li> <li>• Describe your legal responsibilities, limitations, and implications for action in your job role</li> <li>• Compare and contrast behaviors and practices that could result in liability or negligence</li> <li>• Explain legal issues faced by Agriculture, Food, and Natural Resources (AFNR) professionals</li> <li>• Summarize the rights and responsibilities of AFNR workers</li> <li>• Explain what situations are reportable in AFNR facilities</li> </ul> <p>ETHICAL</p> <ul style="list-style-type: none"> <li>• Explain the difference between an ethical practice and a legal responsibility</li> </ul>

		<ul style="list-style-type: none"> <li>• Identify possible ethical issues in agricultural and natural resources settings</li> <li>• Describe ethical work values such as confidentiality, productivity during the day, following safety standards</li> </ul> <p><b>SAFETY</b></p> <ul style="list-style-type: none"> <li>• Define legal and ethical responsibilities for safety procedures</li> <li>• Describe the certification/license requirements to operate specific equipment or perform specific functions</li> </ul> <p><b>SPECIFIC</b></p> <ul style="list-style-type: none"> <li>• Define the Hazard Analysis and Critical Control Points (HACCP) management system</li> <li>• Identify requirements of waste and material transportation</li> <li>• Describe requirements of Resource Conservation and Recovery Act (RCRA)</li> <li>• Explain requirements of Clean Water Act</li> <li>• Explain requirements of Safe Drinking Water Act (SDWA)</li> <li>• Explain requirements of Clean Air Act</li> </ul> <p><b>RECORDS</b></p> <ul style="list-style-type: none"> <li>• Identify the main functions of documents and documentation</li> <li>• Identify the guidelines for retaining common documents</li> </ul>
<p><b>10. Use resources wisely</b></p>	<ul style="list-style-type: none"> <li>• Follow the facility pollution/waste prevention plan</li> <li>• Recycle whenever possible</li> <li>• Dispose of materials appropriately</li> <li>• Dispose of hazards legally and with regard to environmental impact</li> </ul>	<ul style="list-style-type: none"> <li>• Identify current environmental issues affecting the Agriculture, Food, and Natural Resources industry</li> <li>• Define what is meant by making “green” choices</li> <li>• Compare renewable and nonrenewable natural resources</li> <li>• Explain the meaning of sustainable resources use</li> <li>• Identify practices that contribute to sustainability</li> <li>• Describe why wise use of resources at the worksite is important</li> <li>• Give examples of wasteful uses of resources (unnecessary waste and duplication) at the worksite</li> <li>• List materials that can be recycled</li> <li>• Describe materials that require special disposal</li> <li>• Explain purpose of pollution control systems</li> <li>• Relate power generation to energy sources</li> <li>• Compare environmental impact of energy sources (e.g., fuel cells, chemical, wind, hydro, nuclear,</li> </ul>

		electric, mechanical, solar, biological)
<b>11. Use basic technology</b>	<ul style="list-style-type: none"> <li>• Use communication technology (such as pagers, radios, phone, fax, email, Internet) to access and distribute data and other information within the scope of the job</li> <li>• Use email, the Internet, printer, copier, scanner, and fax machine equipment appropriately and correctly as applicable</li> <li>• Follow rules for proper computer and communication technology usage</li> <li>• Use calculating tools such as computer, calculator, and adding machine correctly</li> <li>• Enter, edit, and store data on computerized equipment according to worksite guidelines</li> <li>• Verify data entry prior to data storage or equipment operation</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the parts and functions of a computer system using correct terminology including the keyboard, monitor, mouse, printer</li> <li>• Point out the storage device locations on the computer such as the Hard drive, CD-ROM drive, and Portable File Storage drive, etc</li> <li>• Show the appropriate connections and positioning of peripheral devices such as a mouse, keyboard, monitor, and printer</li> <li>• Discuss the importance of backing up computerized files</li> <li>• Compare different forms of communications technology including email, texting, word processing, spreadsheets, database, presentation software, and use of the internet to communicate, search and display information</li> <li>• Describe how to evaluate internet websites and information for validity and reliability</li> <li>• Explain appropriate and inappropriate uses of email and internet while at work</li> <li>• Describe how to develop effective presentations using appropriate technologies (e.g., tables, charts, and visual graphics)</li> <li>• Explain the use of writing/publishing/presentation applications</li> </ul>

## Safety

<b>Competency (Work Tasks)</b>	<b>Performance Standards</b> What employer checks for while doing task. <b>Train YA Student on.</b> YA student will ...	<b>Learning Objectives</b> What to know/learn to do this task. <b>Content Suggested</b> for Class/Reading/On-the-job Training.
<b>1. Follow personal safety requirements</b>	<ul style="list-style-type: none"> <li>• Participate in all required safety training</li> <li>• Follow all worksite guidelines for personal safety</li> <li>• Apply principles of proper body mechanics when necessary</li> <li>• Report any exposures, injuries, or accidents, personal or to others, immediately, if applicable</li> <li>• Locate and can find key information on Material</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss the regulatory purpose and responsibility of the Occupational Safety and Health Administration (OSHA)</li> <li>• List your rights as a worker according to OSHA</li> <li>• Explain the procedure to follow in case of an exposure, injury, or accident to self or to another</li> <li>• Explain ways your company prevents accidents</li> </ul>

	<p>Safety Data Sheets (MSDS)</p> <ul style="list-style-type: none"> <li>• Handle and dispose of any hazardous materials appropriately, if applicable</li> <li>• Operate only equipment that he/she is trained on</li> <li>• Adhere to equipment safety standards</li> <li>• Visually inspect equipment to ensure safety compliance and function before operation</li> <li>• Wear the required Personal Protective Equipment (PPE) at all times as required by the worksite for specific tasks</li> <li>• Be alert for moving equipment, machinery, and traffic</li> </ul>	<ul style="list-style-type: none"> <li>• List engineering controls that are taken to protect workers from accidents</li> <li>• Describe safe and unsafe work habits and their implications</li> <li>• List safety hazards at your facility</li> <li>• Explain potential hazards associated with blood borne pathogens</li> <li>• Explain the ergonomic impact of work techniques</li> <li>• Describe proper techniques for lifting loads</li> <li>• Describe the Material Safety Data Sheet (MSDS) and its purpose</li> <li>• Discuss the procedures of handling and disposing of hazardous material</li> <li>• Explain facility confined space policy</li> <li>• List mechanical, chemical, electrical, compressed air, and equipment safety hazards at your facility</li> <li>• Describe your facility's chemical hygiene plan</li> <li>• Explain how Lock Out/Tag Out procedures prevent accidents</li> <li>• Define the Personal Protective Equipment (PPE) required for specific tasks in your facility</li> <li>• Explain the use of safety equipment such as eyeball washers and chemical safety showers and when you would use them</li> <li>• Describe ways to prevent burns</li> </ul>
<p><b>2. Maintain a safe work environment</b></p>	<ul style="list-style-type: none"> <li>• Comply with posted safety warnings and symbols</li> <li>• Identify unsafe conditions and/or work habits and reports them to the worksite professional immediately, if applicable</li> <li>• Help maintain a clean and safe working environment free of debris and obstacles</li> <li>• Clean, organize, put away items in the work area</li> <li>• Safely identify, handle, store, and use hazardous materials according to company procedure, if applicable</li> <li>• Report any indications of insects or pests</li> </ul>	<ul style="list-style-type: none"> <li>• List the major components of a facility safety program</li> <li>• List the different state and federal agencies that provide regulatory oversight at your facility for personal safety, environmental safety, and equipment safety</li> <li>• List accident and fire prevention techniques</li> <li>• Describe posted safety warnings and symbols and what they mean</li> <li>• Describe safe and unsafe work habits and their implications</li> <li>• Discuss the importance of keeping the work area and tools/equipment clean</li> <li>• List mechanical, electrical, and equipment safety hazards at your facility</li> <li>• Discuss how to identify and report unsafe conditions in your facility</li> <li>• Discuss safety procedures to prevent accidents</li> <li>• Describe the requirements at your facility for safety</li> </ul>

		<p>training and auditing</p> <ul style="list-style-type: none"> <li>• Assess need for good housekeeping practices</li> <li>• List accident and fire prevention techniques</li> <li>• List hazards that contribute to injury due to slips, trips, or falls</li> <li>• Outline compliance requirements of sanitation and health inspections</li> </ul>
<p><b>3. Demonstrate professional role to be used in an emergency</b></p>	<ul style="list-style-type: none"> <li>• Participate in emergency safety simulations and drills</li> <li>• Outline the company's policy and procedure for worksite incidents, accidents, electrical, fire, tornado, bomb threats, robbery, hostage situations, and other emergency situations</li> <li>• Identify the closest fire alarms and emergency exits in the assigned worksite area</li> <li>• Identify the fire extinguishers in the assigned worksite area</li> <li>• Identify appropriate alarms and procedures for using alarms</li> <li>• Contact emergency personnel according to company requirements in the event of an emergency</li> <li>• Report and document any emergency incidents according to company requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the procedures in your company to report an emergency</li> <li>• Review your company procedures for responding to exposures, injuries, accidents, spills, fire, tornado, bomb threat, robbery, hostage situations, etc.</li> <li>• Demonstrate how to use the fire blanket and/or fire extinguisher</li> <li>• Explain the evacuation plan for the worksite</li> <li>• Indicate the demeanor necessary during an emergency</li> <li>• Identify methods to cope with emergency situations</li> <li>• Name the resources for assistance in crimes or accidents</li> <li>• Locate and explain use of first aid emergency care kits</li> <li>• Detail steps to use in medical emergencies requiring First Aid, CPR, and/or Heimlich maneuver</li> <li>• Locate and explain use of spill kits, if applicable to worksite</li> <li>• Explain who in your facility can give first aid care in the event of an emergency</li> <li>• Explain the local protocols in place with local law enforcement</li> <li>• Explain the role of the Hazardous Materials (HAZMAT) team</li> <li>• Detail how to access help in a robbery or terrorist situation</li> <li>• Explain the use of safety equipment such as eyeball washers and chemical safety showers and when you would use them</li> </ul>

# Appendix K

## AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP

### ANIMAL PATHWAY ANIMAL BASICS UNIT UNIT 3

#### Unit 3: Animal Pathway Animal Basics

Competency

#### 1. Clean and maintain animal quarters

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Cleans animal quarters on a regular basis as required by your facility
- Reviews the procedure for the specific cleaning protocol required prior to performing
- Obtains the appropriate cleaning equipment, solutions, waste containers, and replacement substrate
- Wears required Personal Protective Equipment (PPE) and clothing if applicable
- Rakes, shovels, hoses, wipes, removes any soil or waste from the quarters to appropriate waste containers
- Cleans quarters with appropriate solutions
- Disinfects as required
- Assembles replacement bedding or substrate
- Maintains light, temperature, humidity, and air exchange adequate for type of animal
- **Manages animal waste** as required
- Documents cleaning completion

Learning Objectives

- Identify components of the Animal Welfare Act
- Evaluate laws governing animal research, care, facilities, and production
- Explain how proper facility maintenance impact animal well-being
- Explain the importance of providing adequate space to all animals
- Explain the role of proper ventilation regarding animal well-being
- Describe proper housing requirements for animal species that you are working with

- Identify equipment and handling facilities used in animal care or animal production environments
- List standards (environmental, zoning, construction) that must be met by facilities that perform animal care or animal production
- Compare different types of sanitation and disinfecting techniques

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 2. Safely handle animals

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the specific requirements required for handling, harnessing, or restraining
- Wears appropriate clothing and footwear
- Checks that any restraints or equipment to be used is in working order
- Assesses the animal's behavior prior to handling
- Uses animal calming methods to settle the animal
- Obtains assistance if needed
- Follows safety plan for handling, harnessing, or restraining the animal
- Applies any harnesses or restraint systems safely for you and the animal

Learning Objectives

- Discuss dangers in working with animals
- Compare types of harnesses and restraints for large and small animals
- Describe placements of halters and types of knots used in large animal restraints
- Explain where to stand and how to lead when working with large animals
- List proper restraint techniques for animal(s) that you work with
- Explain factors which stimulate or discourage given types of animal behavior
- Describe ways in which animal behavior is assessed
- List methods for calming animals prior to handling
- Recognize features of typical animal behavior
- Compare and contrast between association and rewarded behavior as training methods for animals
- EQUINE, if applicable
  - Describe and demonstrate basic horsemanship and riding techniques

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 3. Mix feed, additives, and/or medicines

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Consults appropriate diet and/or vet plan to provide correct mix of nutrients, additives and/or medicines for animals' developmental stage or health
- Wears required clothing and maintain cleanliness of area
- Verifies mixing equipment is operational and calibrated
- Obtains ingredients required for mix
- Operates mixing equipment safely
- Mixes ingredients required as indicated in plan in correct amounts
- Labels and stores mix properly
- Documents feed, additives and/or medicines preparation process and mix used

Learning Objectives

- Describe the characteristics of protein, carbohydrates, water, fats/oils, minerals and vitamins and their impact on animal growth, production, and health
- List common types of enrichment additives for the species you work with
- Explain the impact of hormone use on animal production, treatment, and public safety
- Explain why nutrient requirements are different throughout an animal's life cycle
- Recognize legal issues involving drugs in the workplace including standards for medication & treatment records
- Explain components of the medication label
- Compare drug inventory and drug usage records
- Describe common animal prescription medications and over-the-counter medications
- Describe appropriate routes and methods of drug and vaccine administration
- Explain the principles and guidelines for the responsible use of antibiotics

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 4. Manage animal waste

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Treats animal waste on a regular basis as required by your facility
- Reviews the procedure for the specific treatment and/or disposal protocol required prior to performing
- Obtains the appropriate equipment, solutions, and containers
- Wears required Personal Protective Equipment (PPE) and clothing if applicable
- Ensures proper ventilation and airflow of areas to be cleaned
- Collects solid waste materials in appropriate waste containers
- Treats solid waste materials as required
- Disposes of treated solid waste as required

Learning Objectives

- Examine environmental concerns associated with animal waste, such as air and water pollution
- Analyze the environmental regulation for animal waste set forth by governmental organizations, such as the Environmental Protection Agency
- Outline methods to reduce the impact of animal waste on the environment
- Discuss appropriate waste handling methods for the animals that you are working with
- Identify characteristics of solid waste treatment
- Identify the risks associated with solid waste accumulation and disposal
- Describe wastewater collection systems
- Describe the disinfection process in wastewater treatment
- Describe methods to incinerate solid waste
- Describe recycling methods

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 5. Observe and measure animal physical characteristics

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- ***Safely handles animal*** in order to prepare for measurement
- Observes animal gait
- Notes any abnormal behaviors
- Evaluates physical condition by assessing hair, eyes, breathing
- Looks for signs of swelling, limping, or cuts
- Observes mucous membranes and any discharges
- Examines animal teeth
- Measures weight and height
- Measures temperature, pulse and respiration
- Evaluates appetite and feed/water intake
- Documents measurements
- Records patterns of weight, growth and diet

Learning Objectives

- Define basic terms integral to animal anatomy & physiology
- Describe the purpose and function of cells
- Compare plant and animal cells
- Identify animal cell organelles and functions
- Name and locate external anatomy of animals
- Discuss the major functions of vertebrate systems, including digestive, reproductive, circulatory, nervous, muscular, skeletal, respiratory and endocrine
- Describe the interrelationship between animal systems
- Evaluate characteristics of animals that led to their domestication
- Identify signs of a healthy animal- behavior, appetite, coat, skin, and eyes
- Recognize normal ranges for temperature, respiration, pulse, and physical characteristics for a healthy animal versus an unhealthy animal
- Identify signs of an unhealthy animal- behavior, appetite, dry nose, discharge, posture, skin, coat, swelling, and mucous membranes
- Explain how to take temperatures for the animal(s) that you work with
- Explain how to determine pulse, respiration, weight and height for the animal (s) that you work with
- Describe how to determine the age of animals through teeth examination
- Discuss how age and teeth wear can affect animal well-being

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 6. Assist to examine animals

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- ***Safely handles animal*** in order to prepare for examination
- ***Observes and measures physical characteristics***
- Assists to perform simple diagnostic procedures in evaluating an animal's health status
- Compares assessment to designated standard animal chart
- Discusses possible animal ailments based on assessment with worksite professional
- Observes and assists worksite professional to identify and implement treatment options
- Documents examination and treatment or referrals to veterinary services with worksite professional

Learning Objectives

- Classify animals according to anatomy and physiology
- Describe functional differences in animal structures and body systems
- Explain methods for determining animal health and disorders
- Identify ways that an animal's health can be affected by anatomy/physiology problems
- Identify symptoms of common diseases, illnesses, parasites, and other health-related problems for the animal(s) you work with
- Describe how housing, sanitation, and nutrition influence animal health and behavior
- Describe common causes of disease and treatment for the species that you are working with
- List signs indicating dehydration
- Understand the role of the Veterinary Practice Act
- Describe the limits of unlicensed staff to exam and evaluate animal health according to the Veterinary Practice Act
- List preventive measures for controlling and limiting the spread of diseases and parasites among animals
- Describe causative agents and their vectors of diseases in animals

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 7. Collect samples for testing and/or food production

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the specific requirements required for sampling or collecting animal products
- ***Safely handles animal*** in order to prepare for sampling or collecting animal products
- Obtains and prepares equipment as required
- Collects testing sample or animal product
- Uses proper hygiene for obtaining samples to prevent the introduction and spread of infection
- Documents collection
- Cleans/disinfects equipment and supplies

Learning Objectives

- Explain the importance and uses of animal tissues in agriculture and non-agricultural industries for production or for veterinary analysis
- Compare types of tissue samples obtained to assess animal health
- Compare types of tissue samples obtained to assess animal by-product quality
- Compare methods for collecting urine
- Compare methods for collecting feces
- Compare methods for collecting blood
- Identify collection practices that pose safety and health risks
- Identify animal tissues that pose health risks
- Define biosecurity
- Explain the importance of biosecurity to the animal industry

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 8. Maintain animal care and business records

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Selects appropriate forms/records
- Labels and/or code documents as required
- Files forms/records in appropriate location
- Retrieves and replaces files in correct position
- Adds, Edits, Verifies and Queries data in electronic files if applicable
- Uses appropriate computer codes, formatting, macros, charts, spreadsheets, etc.
- Verifies data prior to entry/storage
- Maintains files as required
- Keeps animal records on health at birth, acquisition, or first visit, identity, disease diagnosis and treatment, medications, height and weight, food intake, reproductive events, care related costs, death or sale information as applicable to the business

Learning Objectives

- Describe the functions of business records
- Identify common kinds of business records
- Define terms used in animal records
- Discuss common legal forms used in animal services
- Explain why record keeping is necessary to assess the current financial condition of a business and why it is helpful in planning and preparing for the future
- Identify and describe the characteristics of good record keeping
- Compare manual and electronic record keeping systems
- Demonstrate how electronic data is manipulated such as in a spreadsheet system
- Explain how data & files are stored and “backed up”
- Describe the purpose of security and ID information within record keeping systems
- Describe how animal identification systems track location, nutrition requirements, and/or changes in health
- Explain the importance of a written plan for euthanasia

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 9. Manage inventory

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Checks incoming items for damage
- Verifies incoming items match purchase order and description
- Notifies appropriate parties and take corrective action when defective items are identified
- Monitors location of items
- Monitors inventory use for ordering levels
- Assists worksite professional to perform inventory checks
- Checks that proper inventory levels are maintained
- Rotates items to minimize old and outdated inventory
- Performs inventory counts
- Assists with inventory inaccuracies investigations
- Documents inventory activities

Learning Objectives

- Explain the purpose of an inventory plan
- Identify the costs of maintaining inventory
- List methods of productivity measurement and just-in-time inventory control
- Explain the importance of maintaining inventory levels to minimize inventory value
- Discuss the timing of inventory audits to production requirements
- Describe your facility's policy in the event of inventory shortage
- List examples of situations that indicate the need for a review of storage and retrieval systems to determine if upgrades and replacement are warranted

**Comments:**

## Unit 3: Animal Pathway

### Animal Basics

Competency

#### 10. Evaluate the facility business and marketing plan

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite OR in the classroom in a simulated setting
- NOTE: A simulated setting should ONLY be used IF there is no possibility of skill performance at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies the goals and objectives for the business
- Verifies records are kept and maintained on finances, production, animal health, animal breeding, animal identification, animal registration and sales as required
- Identifies what products are for sale
- Identifies pricing goals
- Describes how product will be merchandised
- Evaluates cost of production
- Evaluates pricing opportunities (cash, futures, options)
- Evaluates pricing indicators (supply & demand)
- Reviews the strategy for evaluating and updating the marketing plan
- Identifies markets for selling products

Learning Objectives

- Define agribusiness and describe the sectors of agribusiness
- Identify and describe basic categories of resources, and explain why each is necessary to produce a product
- Explain factors that determine the ability of a business to start successfully
- List and explain the factors that typically contribute to the success and failure of agribusinesses
- Explain the purpose and importance of a business plan
- Describe the parts of a business plan
- Appraise and evaluate the economic value of animals for various applications in the agriculture industry
- Review pricing methods
- Explain how to price that includes a reasonable return on investment
- Relate production size to costs
- Calculate housing, feed, utility, breeding, and vet care costs
- Define marketing and the marketing mix
- Define the purpose for developing a marketing plan
- Explain the essential elements of a marketing program
- List marketable animal products and byproducts
- Compare organic animal industry to traditional animal production

**Comments:**

# **Appendix L**

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **ANIMAL PATHWAY LARGE ANIMAL/HERD UNIT UNIT 4**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 1. Clean and groom animals

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the specific requirements required for cleaning & grooming
- ***Safely handles the animal***
- Wears appropriate clothing and footwear
- Assembles the cleaning & grooming solutions, tools, and equipment
- Brushes and/or rubs down animal thoroughly
- Clips the nails carefully OR cleans and trims hooves if applicable and allowed by worksite professional
- Clips or shears hair as required
- Checks for signs of infection as you clean and groom
- Dips or bathes animals, top to bottom, with appropriate bathing solutions and scrubbers
- Sprays animals with disinfectant and insecticides
- Cleans ears careful not to go too deep into the ear canal
- Dehorns young males if applicable and allowed by worksite professional
- Reports unusual observations to the worksite professional
- Documents cleaning and grooming process as required

Learning Objectives

- Identify animal parts from a diagram or on a real animal
- List possible signs of infection that can be observed when grooming an animal
- List the safety precautions and proper use of grooming tools that you will use with the animal(s) that you work with
- Compare disinfectants, parasitic dips, and insecticides used in cleaning animals
- Explain safety precautions required for nail and hoof trimming
- Describe processes for nail and hoof trimming
- Describe processes for ear cleaning
- Describe processes for clipping and shearing
- Identify trimming procedures according to the animal's structural features
- Describe processes for brushing and bathing
- Define the role of a farrier
- Compare methods of dehorning and when to use each method
- Explain why males are dehorned

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 2. Feed and water animals

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Feeds and waters animals regularly and consistently as required by facility
- Consults appropriate diet plan for animals' developmental stage or health
- **Mixes feed, additives and/or medicines**
- Offers feed to animal(s) in appropriate manner for animal
- Replaces or freshens water supplies in containers, tanks, at a natural source or with watering systems as required
- Ensures any watering systems are insulated, adjusted for height and flow rate and supplies are adequate
- Heats or insulates water to keep from freezing if needed
- Observes appearance and behavior of eating and drinking
- Documents feeding and watering times
- Periodically, cleans feed containers as needed to remove spoiled food and/or manure

Learning Objectives

- Explain the components of Good Manufacturing Practices and how these components prevent feed contamination and ensure proper mixing
- Explain the different phases of an animal's life cycle
- Compare the various types of digestive systems (mono-gastric, ruminant, avian, pseudo-ruminant) found in herd or food animals
- Identify the major parts of the digestive system and describe their functions
- Explain the functions of feed
- Identify the various feed types and characteristics
- Analyze suitable common feed ingredients including forages, roughages, concentrates, and supplements
- Compare and contrast the types of feedstuffs (roughages, concentrates, and supplements/additives)
- Distinguish between good quality and poor quality feedstuffs
- Explain the purpose and benefits of feed additives and growth promotants
- Explain how herd animals are fed
- Discuss the proper nutrient and water requirements for your livestock at the various stages of production
- Identify the role of the NRC (National Research Council) for nutrient requirements in research animals

**Comments:**



## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 3. Mark or tag animals

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the specific requirements required for marking & tagging the animal
- ***Safely handles the animal***
- Wears appropriate clothing and footwear
- Assembles the appropriate tools and equipment
- Marks animal using brands, tags, paints or tattoos
- Cleans and sanitizes marking equipment if applicable
- Observes animals for infection for a few days

Learning Objectives

- Identify tools and methods for identification of individual animals and groups/pens
- Discuss why animals are marked
- List common methods of marking
- Compare methods of identification for cattle, swine and sheep
- List common earmarks for cattle
- Explain guidelines for timing of ear tagging/marking

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 4. Herd and/or patrol/monitor animals

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Periodically moves animals from one location to another according to facility requirements
- Moves animals in manner to reduce agitation and anxiety
- Herds animals separated from group back to group
- Patrols land and animals for wandering, grazing, behavior, predators, etc.
- Uses trained dogs to ward off predators if applicable

Learning Objectives

- Explain why animals are herded or moved around
- Describe methods for moving the animals that you work with
- List methods to keep animals calm when moving
- Discuss the role of rangeland use in effective animal production
- Explain how rangeland use practices affect pasture production, erosion control and ecosystem balance
- Define carrying capacity
- Explain how to manage rangelands for different animal species and locations
- Describe the pasture and grazing requirements for the animal(s) you work with
- Describe liabilities associated with animal trespass
- Explain liabilities associated with animals on roads

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 5. Monitor animal food and water supplies

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Stores feed appropriately at correct temperature and conditions until needed
- **Mixes feed, additives and/or medicines** when needed
- Ensures adequate supplies of feed and water
- Observes feed and/or water consumed by the group of animals
- Records consumption of feed and water as required by your facility
- Replenishes feed and water supplies as required
- Re-orders and mixes feeds to maintain stocks of feed and water source as needed
- Examines animals regularly with worksite professional to determine animal performance
- Reviews feed consumption records
- Discusses method and frequency of feeding with worksite professional in order to enhance feed utilization or animal performance
- Tests water supplies periodically as required with worksite professional

Learning Objectives

- List the common forms and types of feed utilized by your facility
- Describe proper feed storage and handling practices of feed
- Explain the importance of monitoring feed and water consumption by a group of animals
- Describe the function of feed consumption records
- Calculate cost and return analysis of feeding program
- Calculate cost per unit of nutrition of feeds
- Describe how byproducts (dried distiller's grains, corn gluten meal, etc.) can be used in livestock rations
- Discuss the importance of clean and safe water supplies for animal production
- Describe how water systems are evaluated for safety

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 6. Assist to optimize animal performance and production

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Researches optimum performance for a given animal species
- Assesses an animal to determine if it has reached its optimum performance level
- Reviews the facilities to ensure appropriate environment for production of a given species of animal
- Makes appropriate changes in an animal's environment in order to achieve optimum performance
- Records animal performance
- Compares performance measurements to feed variations
- Assists to develop procedures that produce consistently high-quality animals so that both profit and animal safety are maximized

Learning Objectives

- Identify good performance or desired traits (e.g., performance) for a given animal species
- Identify reasons why some animals perform better than others
- Identify factors that can be manipulated to control a given animal's performance
- Identify a given species' desirable production numbers (e.g., birth weight, rate of gain, age of maturity, age of sexual maturity)
- Discuss the importance of feed analysis
- Discuss ways to adjust feed processing that may enhance consumption and digestion
- Identify the steps in balancing a ration to optimize animal performance
- Discuss how nutritional information is used in developing rations
- Develop balanced rations using the Pearson square method
- Compare advantages and disadvantages of growth stimulants
- Describe methods other than growth stimulants to improve efficiency and rate of gain
- Define what is meant by extra-label use and veterinary feed directive drugs
- Describe the FDA ruling on extra label use of drugs in medicated feeds

DAIRY

- Analyze the production practices involved in the care of dairy calves from birth to weaning
- Analyze the production practices involved in the care of dairy replacement heifers, lactating cows, and dry cows
- Describe the common dairy feeding systems, such as the total mixed ration system
- Determine the importance of body condition scoring, and describe how it is used to modify feeding practices
- Examine the role of Dairy Herd Improvement Associations

#### SWINE

- Analyze production practices involved in the care of pigs in feeder pig production
- Examine factors that affect profitability in pork production
- Describe the feed rations utilized in each stage of swine production

#### CHICKEN

- Describe the feed rations utilized in each area of chicken production

#### EQUINE

- Describe the types of feedstuffs fed to equine
- Analyze the nutritional requirements of equine

#### **Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 7. Collect and process animal products and by-products

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the specific requirements required for collecting and processing animal products or by-products
- ***Safely handles the animal***
- Wears appropriate clothing and footwear
- Assembles the appropriate tools and equipment
- Prepares and ***safely handles animal(s)*** if needed
- Collects animal product safely and in a manner consistent with safe and sanitary practices
- Cleans any tools or equipment used
- Documents collection amounts

MILKING

- Prepares vacuum pump, lines, and vacuum controller
- Evaluates rate, ratio and action of pulsation system
- Evaluates size & maintenance of claw, teatcups, and liners
- Evaluates milk lines, receiver jars, bulk tank, & milk metering devices
- Moves cows in consistent, stress free manner to milking area
- Uses proper pre-milking hygiene
- Properly and adequately stimulates cows for milk preparation
- Attaches teat-cups in timely manner after stimulation
- Adjusts teat-cups as required
- Evaluates cows for complete milking
- Properly removes claw
- Cleans animals and equipment as required post-milking
- Documents amount of milk harvested
- Properly cools and stores milk

OTHER FOOD/FIBER

- Eggs
- Wool/Fur
- **NOTE:** Butchering of MEAT is NOT considered an agriculture activity for minors per DWD 270.12(18)

Learning Objectives

- Investigate the role of contract production and vertical integration in the agriculture industry

MANURE

- Define manure, and examine its worth as fertilizer, compost, or a source of methane

- Determine how the composition and quantity of manure varies according to species and other factors, such as the amount and type of feed
- Describe the manure-management practices utilized by livestock operations, including the application of manure as fertilizer

#### MILKING

- Summarize animal movement through the milking center
- Review milking operation hygiene
- Outline the correct milking procedures
- Describe parlor performance
- Analyze the production practices involved in the care of dairy replacement heifers, lactating cows, and dry cows
- Identify the types of milk
- Explain how milk is graded and classified
- Describe samples of milk for flavor and odor

#### EGG

- Describe the egg grading and classification system
- Explain the role of candling in determining egg quality

#### POULTRY

- Describe the poultry carcass grading system, and analyze production factors that affect carcass quality
- Identify the cuts of meat found on a poultry carcass
- Investigate the role of contract production and vertical integration in the poultry industry

#### MEAT

- Identify the average dressing percentages for cattle, sheep, rabbits, and hogs
- Determine factors that affect dressing percentage
- Practice calculating dressing percentages
- Describe the beef grading system; analyze factors that affect quality and yield grades; and practice calculating yield and quality grades
- Demonstrate the ability to estimate quality and yield grades of live animals

#### Comments:

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 8. Assist with reproductive selection

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite OR in the classroom in a simulated setting
- while assisting a worksite professional
- NOTE: A simulated setting should ONLY be used IF there is no possibility of skill performance at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies the facility's goals for genetic improvement
- Identifies the genetic traits needed to improve the profitability of the animal group noting the genealogy, traits, and desired offspring characteristics
- Reviews the testing and production records of the animal
- Consults USDA sire summaries to predict production improvement
- Identifies the source of the desired group of genes
- Selects animal(s) based on breeding soundness

Learning Objectives

- Explain how agricultural animals are classified scientifically
- Discuss how traditional farm animal breeds were developed
- Summarize the importance of genetics to the animal industry
- Explain how producers use genetics to produce the type of animal they want
- Define basic Mendelian principles: dominance, recessive, incomplete dominance, etc.
- Describe how heritability is used in animal selection
- Compare phenotype and genotype characteristics
- Describe how dominant and recessive genes function
- Interpret an animal pedigree
- Explain how to select superior animals
- Summarize how performance data is used in the selection process
- Explain the use of quantitative breeding values (EPDs) in selection of genetically superior breeding stock
- Discuss the implications of genetic variation
- List and describe the Predicted Transmitting Ability (PTA) used in the dairy industry
- Outline future trends in the genetic field

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 9. Assist with reproductive breeding and/or birthing

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite OR in the classroom in a simulated setting
- while assisting a worksite professional
- NOTE: A simulated setting should ONLY be used IF there is no possibility of skill performance at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the specific requirements required for breeding
  - **Safely handles the animal**
  - Wears appropriate clothing and footwear
  - Assembles the appropriate tools and equipment
  - Prepares and **safely handles animal(s)** as needed
- ARTIFICIAL INSEMINATION BREEDING- or Other according to procedure
- Attaches rubber collecting sheaths to genitals and stimulate to induce ejaculation
  - Examines semen to assess density & motility
  - Mixes with prescribed diluents
  - Packages and labels semen
  - Stores semen for storage or shipment in dry ice or liquid nitrogen
  - Measures semen into calibrated syringes
  - Inserts syringes into inseminating guns
  - Injects semen into female animal vagina
  - Documents semen used and animals bred
- BIRTHING
- Assembles equipment needed
  - Provides fresh water and feed
  - Readies a source of heat for the newborn
  - Prepares bedding for the newborn
  - Moves female to birthing area
  - Observes female frequently
  - Refills feed and water as needed
  - Observes delivery without interfering
  - Observes behavior of newborn
  - Records times of birth and placental expulsion if applicable
  - Disposes of placental membranes as required
  - Encourages newborn to nurse

Learning Objectives

**REPRODUCTION**

- Identify structures and functions of reproductive systems

- Explain the role of estrogen, progesterone, testosterone, prolactin, oxytocin, and prostaglandin in reproduction
- Analyze the reproductive cycle of animal(s) that you work with
- Describe signs of estrus in the animal(s) that your work with
- Describe the physical characteristics of large animals in heat
- Describe the fertilization process
- Describe length of reproductive cycles for females
- Identify reproduction management practices (e.g., male to female ratios, age and weight for breeding, fertility and soundness for breeding, heat synchronization, flushing)
- Describe the procedure for determining an animal's breeding readiness
- Explain common animal reproductive problems

#### METHODS

- Compare natural and artificial breeding methods
- Discuss the pros and cons of breeding through natural cover and artificial insemination
- Compare AI (Artificial Insemination) and MOET (multiple ovulation and embryo transfer), as a means of genetic improvement
- Explain reproductive breeding management practices such as estrous synchronization, superovulation, flushing, and embryo transfer

#### PREGNANCY & POST-PARTUM

- Discuss animal care during gestation, parturition, and lactation
- Identify characteristics of pregnancy
- Identify length of the gestation period for animals that you work with
- Explain the normal characteristics of birthing for the animal(s) that you work with
- Discuss expected behavior and care of newborns
- Identify length of lactation period

#### **Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 10. Assist to prevent the spread of animal diseases

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Consults bio-security and livestock health plan
- Keeps herd as closed as possible
- Tests new livestock for disease
- Isolates and monitors new livestock for the recommended period
- Follows strategic vaccination and pest prevention program
- Assists to administer prevention product to animal in feed, water, injection, drench, bolus, or spray/pour skin treatment
- Regularly sanitizes loading areas and transport vehicles
- Follows rodent and pest control measures

Learning Objectives

- Describe the herd management plan at your facility to maintain & improve herd health
- Compare the life cycle stages of internal and external parasites
- Identify common internal and external parasites that affect livestock
- Describe diseases common parasites cause
- List methods used to control parasites in herd disease management
- Explain how cleanliness affects disease control
- Compare antiseptics and disinfectants
- Describe types of vaccines available
- Identify the care and use of instruments (multi-dose hypodermic syringe, hypodermic syringe and needle, drench gun, balling gun) used to administer vaccines and pharmaceuticals
- Describe preventative measures and methods to prevent broken needles
- Identify common diseases found in agricultural animals
- Discuss appropriate treatment methods for common diseases
- List preventive measures for controlling and limiting the spread of diseases and parasites among animals
- Describe signs of pests that can be observed in the facilities
- Discuss economic impact of disease in a herd
- Explain the health risk of animal disease to humans
- Discuss consumer concerns with animal production practices relative to human health
- Define biosecurity
- Explain the importance of biosecurity to the animal industry
- Discuss regulatory procedures to ensure biosecurity of the animal industry

- Explain landowner rights in regard to the destruction of animals

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 11. Operate equipment & machinery safely

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Operates only equipment that he/she is trained on
- Verifies tool/equipment is available for use and in working order
- Verifies tool/equipment is current for preventative maintenance and/or calibration
- Verifies safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use
- Inspects tool/equipment and work area for safety considerations
- Sets up and prepares tool/equipment for safe operation including lubrication and fluid level checks
- Wears the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment
- Operates tool/equipment safely with guarding devices if applicable in the manner required for the job task
- Monitors tool/equipment for safe operation while operating
- Follows procedures for clean up and shut down after use
- Investigates and promptly reports abnormal tool/equipment conditions
- Shuts down and labels any tool/equipment that is not operating as expected, if applicable
- Stores tools

Learning Objectives

- List the various tools and equipment used at your worksite such as herding vehicles, cleaning & grooming tools, animal by-product collection equipment, cutting and non-cutting hand tools, sawing machines, diagnostic tools, etc.
- Outline applications of each tool and equipment
- Demonstrate the proper usage of a tool or piece of equipment
- Describe and demonstrate the safety requirements for each tool and equipment
- Discuss start up and shut down procedures for each tool/equipment you will operate
- Describe emergency shutdown procedures for the tool/equipment you will operate
- Describe the characteristics of a tool in need of maintenance
- Explain how to recognize and address malfunctions for the tool/equipment you will operate
- Describe how to recognize wear and tear on equipment components
- Describe regulations for the use of tools and equipment at your facility
- Explain Lock Out/Tag Out indications and procedures

**Comments:**



## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 12. Clean and service equipment & machinery

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Performs required cleaning and preventive maintenance (PM) on equipment as required by schedule
- Reviews safety requirements and PM procedures first
- Sets up and prepares tool/equipment for safe operation including lubrication and fluid level checks if applicable
- Maintains fluid levels
- Calibrates metering, monitoring, and sensing equipment
- Refers to technical information manuals for inoperative equipment
- Checks correct amount and types of lubricant, fuel amount, coolant amount, belt tension, temperatures, pressures, gaskets & seals, leaks, etc., as pertinent to your worksite equipment
- Arranges for service of vehicles as needed with worksite professional if applicable

Learning Objectives

- Define preventative maintenance
- List common agricultural equipment and machinery requirements
- List which tools and equipment require calibration and/or safety certification
- Describe how to use the repair manual to apply repairs and look up parts information
- Describe physical principles of operations of hydraulic systems
- Describe the general operation of electrical systems (circuits design, starting, charging, and safety circuits)

**Comments:**

## Unit 4: Animal Pathway

### Large Animal/Herd

Competency

#### 13. Maintain facilities

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies and select appropriate building materials
- Insulates facility
- Installs fencing
- Installs glass, ridged plastic panels and/or film plastic
- Constructs with concrete, stone, and brick
- Paints or protects with coatings
- Assists to install plumbing equipment, plumbing fixtures, electrical wiring components and electrical fixtures
- Constructs with wood and metal
- Complies with government regulations and applicable codes

Learning Objectives

- List common agricultural facility requirements
- Identify parts of a basic plan or blueprint
- List local code enforcement agencies and procedures
- Identify materials used in agricultural construction/fabrication
- Describe safety precautions to be taken when working with electrical wiring and fixtures

**Comments:**

# **Appendix M**

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **ANIMAL PATHWAY SMALL ANIMAL/VET ASSISTANT UNIT UNIT 5**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 1. Manage clinic or research appointments

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Answers and directs phone calls courteously
- Ascertains time required for vet service(s) or lab animal access
- Refers client to worksite professional for priority scheduling to address emergencies and/or urgent care
- Identifies conflicts in facility schedule and those of the client's schedule
- Assists in recommending resolution to scheduling conflicts
- Confirms that client and the facility have the identical medical appointment information
- Accurately enters appointment times and other required information according to facility guidelines manually and/or electronically as applicable
- Prepares an appointment card if client is present
- Greets client upon arrival
- Documents any scheduling changes in the correct manual and/or electronic locations, if applicable
- After appointment time, learner documents status of the appointment: late, no show, rescheduled, cancelled, etc. according to facility guidelines

Learning Objectives

- List the elements about an appointment schedule that are most important to the client
- List the scheduling elements of greatest concern to the facility
- Describe the appointment procedures used in your facility
- Detail the client information required for most scheduling procedures
- Describe the importance of reminder calls for appointments
- List the types of calls that indicate a need for immediate service according to your facility guidelines
- Identify office procedures for handling animal medical emergencies
- Explain how departments/facilities handle "no show" appointments
- Recognize the scope and economic impact of the companion animal industry.
- Analyze the history of domestication of common companion animals
- Determine the benefits of companion animals for humans
- Describe the human / companion animal bond
- Identify and discuss some trends in companion animal production and care
- Review the history and controversies surrounding research using animals to evaluate products for human safety

**Comments:**



## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 2. Set up for animal exams & procedures

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Stocks lab and examination room supplies
- Verifies procedure to be performed
- Consults procedure and its setup requirements
- Gathers the equipment and supplies that will be used for the procedure
- Ensures the cleanliness of the procedure equipment and area/room
- Checks the equipment for malfunction or damage if applicable and allowed
- Reads labels to confirm that any solutions and supplies are correct and not expired
- Arranges the equipment and supplies in the order in which they will be used
- Materials are ready prior to the start of the procedure
- Reports the status of supplies and equipment to the worksite professional
- Documents procedure set up, if applicable

Learning Objectives

- Identify the therapeutic and diagnostic procedures most commonly administered in your facility
- Identify common medical supplies for basic procedures
- Describe the major purpose for each of the procedures identified
- List the types of equipment and supplies that are required for each of the procedures identified
- Identify the care and use of instruments (multi-dose hypodermic syringe, hypodermic syringe and needle, pill gun) used to administer vaccines and pharmaceuticals
- Define the medical terms and abbreviations related to each of the procedures identified
- Detail the importance of equipment and supply checks before procedures
- Explain the importance of a clean environment and clean equipment in the procedure room or area
- Detail how the room/area will be set up to facilitate easy access to necessary equipment and supplies
- Define surgical asepsis, sterile field and describe how test supplies can be contaminated
- Explain how to set up a sterile field
- Explain how to handle bio-contaminated materials
- Describe the different types of animal research
- Identify animals commonly used in laboratory research
- Explain how the well-being of lab animals is ensured

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 3. Clean & sterilize equipment

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Cleans instruments to remove all residual matter, such as blood or organic tissue
- After cleaning, rinses and allows instruments to thoroughly dry
- Places cleaned & dried instruments in sterilization pouches or wraps
- Labels and seals instruments properly
- Places instruments in autoclave or other sterilization equipment
- Ensures instruments remain apart during the sterilization cycle
- Places empty canisters upside-down in order to prevent accumulation of water
- Does not overload sterilizer trays
- Allows a distance between trays to permit steam circulation
- Records operator initials, date sterilized, minutes of cycle, heat of sterilizer (max) and results, if known (indicator strip turned color, biological control run) if performed.

Learning Objectives

- Explain the clinical significance of sterilization and aseptic technique in animal treatment
- Explain how cleanliness affects disease control
- Compare antiseptics and disinfectants
- Compare sterilization methods
- Identify and describe the function of instruments used in veterinary practice
- Explain the equipment and supplies sterilization requirements for each of the procedures identified

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 4. Maintain and Quality Control (QC) diagnostic equipment

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies Maintenance/QC (quality control) schedule for equipment and/or supplies that produce test results
- Identifies equipment and/or supplies that require maintenance/QC
- Labels equipment appropriately to show malfunction, if applicable
- Identifies location of repair service information, maintenance manuals, and/or troubleshooting guides
- Verifies procedure to follow with worksite professional
- Performs/calls service for routine maintenance or malfunction according to procedure in accordance with equipment manual/maintenance instructions and service agreements
- Documents the maintenance and/or repair/troubleshooting performed
- Performs routine QC procedures according to procedure in accordance with equipment manual/maintenance instructions using Standard Precautions
- Reviews QC results with worksite professional to verify function of equipment/supplies
- Accurately documents the QC performed
- Cleans and maintains equipment and work areas

Learning Objectives

- Explain why performing routine maintenance of equipment reduces the risk of liability and costs to the facility
- Describe the basic procedure to be followed when a piece of equipment is not functioning properly in your facility
- Discuss how tracking of equipment maintenance and servicing is done in the facility
- Review each piece of equipment's cleaning and maintenance schedule
- List the critical pieces of equipment in your facility which require priority repairs when malfunctioning
- Discuss the need for quality control (QC) samples and/or equipment controls in diagnostic testing
- Define positive and negative control
- Describe how equipment function is monitored through QC processes
- Explain how each machine functions to perform lab tests
- Identify the equipment and/or supplies in your facility that require QC
- List the repair and service contractors that service your facility and what they service

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 5. Assist to collect diagnostic samples

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Verifies sample to be collected/processed
- Reviews the specific requirements required for sampling
- **Safely handles animal** in order to prepare for sampling
- Obtains and prepares instruments as required
- Assists worksite professional to explain collection procedure to client in words the client understands
- Assists to obtain consent for testing
- Assists with collection of specimen according to facility guidelines noting animal safety and Standard Precautions
  - Collects voided urine samples
  - Assists to draw blood for vet analysis
  - Assists to use fecal loop to obtain fecal sample
  - Examines feces for texture, amount, and color
- Labels OR confirms that the specimen is labeled accurately and completely
- Completes/cosigns paperwork/requisition for collecting and processing specimen
- Delivers specimen, arrange for pickup, or store specimen
- **Cleans & sterilizes equipment** and supplies and dispose of bio-contaminated articles according to facility guidelines using Standard Precautions

Learning Objectives

- Identify the external parts and describe the physiology of a dog
- Identify the external parts and describe the physiology of a cat
- Compare and contrast the types of rodents and describe management practices involved in their care
- Discuss the use of Standard Precautions while collecting and handling specimens
- Name the specimens collected most frequently in your facility
- Review the procedures for collecting specimens for your facility's specific tests
- Name the equipment and special supplies used for collecting specimens
- Describe your role in the collection and processing of specimens
- Describe the appropriate labeling and storage requirements for specimens
- Explain the purpose of venipuncture
- List the required equipment and supplies needed to perform a venipuncture
- Locate appropriate anatomical sites for venipuncture on animals served by your facility

- Differentiate between different types of specimens including whole blood, serum, plasma, and mucous
- Compare and contrast needles according to gauge, type, and use

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 6. Run basic diagnostic tests

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Locates and identifies the specimen to be tested
- Prepares samples for mailing or shipping if needed
- Selects the correct equipment and supplies
- Includes QC samples, if applicable
- Tests the specimen according to facility guidelines using Standard Precautions
  - Performs basic urinalysis for color, clarity, odor, specific gravity and chemical strip test
  - Obtains packed cell volume (PCV) on blood samples
  - Prepares fecal flotations in solutions
- Verifies counts, measurements, and/or color reactions with the worksite professional
- Cosigns the recording of the test results
- **Cleans & sterilizes equipment** and supplies and disposes of bio-contaminated articles according to facility guidelines using Standard Precautions

Learning Objectives

- Define zoonosis
- Explain the health risk of animal disease to humans
- Identify common diseases in companion animals
- Identify common internal and external parasites that affect companion animals
- Describe the diseases that parasites may spread or cause
- Diagram and describe the complete life cycle of common parasites that affect animals
- Recognize the importance of controlling parasites, and describe methods used to control parasites in disease management
- Identify the major parts of a microscope.
- Demonstrate the proper use and care of a microscope.
- List the reasons for doing a urinalysis
- Outline the procedures for collecting a routine urine specimen
- Describe the procedure for collecting a stool specimen
- List some of the tests that will be performed on a stool specimen
- List the most common tests used to determine characteristics of urine
- Describe normal values and conditions resulting in abnormal test results
- Explain quality control and assurance issues in urine testing
- Explain storage and disposal procedures

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 7. Assist to administer routine treatments, vaccines, and medications

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies animal
- Assists the worksite professional to review the purpose and the steps of the procedure with the client in words the client understands
- Verifies that the area, equipment, and supplies are appropriate, in-date, and ready for the procedure
- Assists in positioning animal using proper body mechanics
- Assists with procedural steps performed by the worksite professional noting animal safety and Standard Precautions
- **Monitors and reports any response** to the procedure to the worksite professional
- Labels and processes any specimens when applicable
- Documents (cosigns) assistance while procedure was performed
- **Cleans & sterilizes equipment** and supplies and disposes of bio-contaminated articles according to facility guidelines using Standard Precautions as applicable

Learning Objectives

- Identify common vet medical terms
- Identify good animal health management practices
- Explain common maintenance needs to promote animal health
- Identify common diseases found in companion animals, and determine the appropriate treatment methods
- Identify common diseases for dogs and determine appropriate prevention and treatment methods (including vaccination schedules)
- Identify common diseases for cats and determine appropriate prevention and treatment methods (including vaccination schedules)
- Examine the primary and secondary defenses the body uses to resist disease
- Recognize the two categories of immunity and compare the types in each category
- Distinguish between the two classifications of drugs (biologics and pharmaceuticals)
- Examine the use of vaccines in disease control and distinguish between modified live and killed vaccines
- Examine the types (antibiotics, steroids, sulfa compounds, hormones) and forms (liquids, powder, boluses, drenches, and feed additives) of pharmaceuticals
- Describe appropriate storage methods for medications and recognize how improper storage conditions may affect drugs

- Illustrate the methods (topically, orally, and injected) used to administer vaccines and pharmaceuticals
- Describe the types of injections, and determine the appropriate injection sites
- Examine the components of a label found on animal medication, and interpret a veterinarian's prescription
- Demonstrate the ability to appropriately administer first aid and apply bandages (pressure and wound)
- Define dose, dosage, and concentration
- Complete conversions necessary to formulate dosages (kg to lb., mg to cc/mL), and calculate appropriate dosages (tablet and liquid) based on body weight
- Read graduated cylinders and syringes, and fill them with correct amounts of medication
- Discuss options in implanted pet identification and location procedures & materials

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 8. Assist to prepare animals for surgery

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies animal
- Verifies that the area, equipment, and supplies are appropriate, in-date, and ready for the procedure
- Obtains & sets up sterile instruments and supplies
- Prepares gowns, masks, gloves and drapes
- Assists in positioning animal using proper body mechanics
- **Observes** surgical procedural steps performed by the worksite professional
- Labels and processes any specimens when applicable
- Cleans/disinfects and/or **sterilizes equipment** and supplies and dispose of bio-contaminated articles according to facility guidelines using Standard Precautions as applicable

Learning Objectives

- List common surgical procedures performed at your facility
- Identify and describe common surgical instruments
- Identify common suture materials, types and sizes
- Describe the preparation of surgical sites using aseptic techniques
- Identify the position(s) necessary for the animal during each common therapeutic and diagnostic procedures performed in your facility

**Comments:**

## Unit 5: Animal Pathway Small Animal/Vet Assistant

Competency

### 9. Monitor animal responses to non-surgical procedures

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Monitors respirations, heart, body temperature, and mucous membranes
- Positions self during procedure so as to make the necessary observations of animal reactions
- Observes for signs of distress
- Reports distress symptoms to worksite professional as noted
- Accurately reads vital signs, if applicable to monitoring in the procedure
- Documents observations of response to treatment following facility guidelines

Learning Objectives

- Explain how to take temperatures for the animal(s) that you work with
- Explain how to determine pulse, respiration, weight and height for the animal (s) that you work with
- Recognize normal ranges for temperature, respiration, pulse, and physical characteristics for a healthy animal versus an unhealthy animal
- List and describe emergency medical situations and possible solutions
- Outline the importance of monitoring during a procedure
- List the signs to be observed during a procedure
- Describe the signs/symptoms that indicate distress
- Explain the value of measuring vital signs, especially heart rate and blood pressure, during some procedures
- Identify how your facility handles emergency situations
- Discuss the importance of documenting any reactions/responses to a procedure including follow up care
- Outline potential adverse reactions to common procedures
- Describe the positive results expected from common procedures

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 10. Service customers and/or collect fees

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Interacts with customers and colleagues in a professional manner (e.g., prompt, friendly, courteous, respectful, helpful, knowledgeable, understandable)
- Answers customer questions within the realm **of current training & learning** OR refer to worksite professional
- Provides, and orders if applicable to worksite, pet identification supplies
- Provides appropriate literature as directed or requested
- Accepts payment for services, sales items, and/or prescribed medications
- Documents disbursements or deposits to the cash drawer in the appropriate record, if applicable
- Processes client cash or credit payment according to facility guidelines
- Operates cash register, if applicable
- Makes accurate change
- Cash Drawer balances with the day's receipts and disbursements

Learning Objectives

- List the requirements for client identification when presenting a check or credit card
- Indicate the importance of client verification procedures when accepting check or credit card payments
- Describe components of an acceptable check
- Explain your facility's guidelines for checks
- Explain how to operate your facility's cash register, if applicable
- Compare and contrast groups and breeds of dogs
- Analyze the factors to consider when selecting a dog
- Describe the nutritional requirements for dogs, analyze the components of dog food, and recognize appropriate feeding practices for dogs
- Examine dog behaviors and describe management, training, and grooming techniques
- Compare and contrast the short-haired and long-haired classes and identify some major breeds of cats
- Analyze the factors to consider when selecting a cat
- Describe the nutritional requirements for cats, analyze the components of cat food, and recognize appropriate feeding practices for cats
- Identify animals commonly used as safety and/or service animals and describe how they are used
- Describe grooming techniques and requirements for cats and dogs

**Comments:**

## Unit 5: Animal Pathway

### Small Animal/Vet Assistant

Competency

#### 11. Assist with animal euthanasia

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite OR in the classroom in a simulated setting
- while assisting a worksite professional
- NOTE: A simulated setting should ONLY be used IF there is no possibility of skill performance at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews appropriate forms for euthanasia consent and disposal with owner
- Assists worksite professional to explain process to owner in layman's terms and what is to be expected during procedure
- Identifies animal
- Verifies that the area, equipment, and supplies are appropriate, in-date, and ready for the procedure
- Assists in positioning animal using proper body mechanics
- Allows the owner a chance to say goodbye
- **Observes** the administration of the injection
- Offers owner grief counseling materials
- **Cleans & sterilizes equipment** and supplies and dispose of bio-contaminated articles according to facility guidelines using Standard Precautions as applicable

Learning Objectives

- Compare methods used to euthanize animals
- Describe the drugs used by veterinarians to euthanize an animal
- Explain the actions of the drugs on the animals systems
- List possible body movements that may result from the injection prior to death
- Discuss the importance of the grieving process for the owner

**Comments:**

# **Appendix N**

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **PLANT PATHWAY PLANT BASICS UNIT UNIT 6**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 1. Prepare planting spaces

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Makes site measurements
- Evaluates site for easements, setbacks, etc, if applicable
- Ensures utility companies have pre-marked locations of buried utility lines
- Produces maps using drawings, surveys, CAD, and/or geospatial computerized applications
- Obtains appropriate soil/media OR ***prepare current soil***
- Prunes or trims around space to allow for appropriate lighting and air circulation
- Removes sticks, stones, and other trash
- Removes plant debris that may harbor insects and diseases
- Tills current soil
- Levels site
- Takes soil sample to determine fertilizer needs

Learning Objectives

- Describe the various uses of plants in everyday life
- Identify important types of plants and explain their uses
- Identify land use management regulations
- Compare local land use management systems

**EROSION & DEGRADATION**

- Describe soil degradation
- Identify sources of soil degradation
- Examine management strategies that limit soil degradation
- Define soil erosion
- Identify the causes of soil erosion
- Explain the ways in which different types of wind erosion occur and the associated problems
- Distinguish between the different types of water erosion
- Discuss erosion control methods

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 2. Prepare soils/media

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Collects sample from soil or media
- Tests soil/media OR send sample for testing
- Evaluates soil/media permeability and water-holding capacity
- Interprets tests of soil/media with worksite professional
- *Assists to* develop planting and fertilization plan with worksite professional based on plants to be grown
- Plows or tills or turns soil to appropriate depth
- ***Mixes fertilizers and additives***
- ***Applies fertilizers***

Learning Objectives

- List major soil components and types
- Explain how soil structure, texture, pH and salinity affect plant growth
- Describe organisms found in soil and their benefits to the soil
- Describe the ways plants use soil
- Identify soil formation factors
- Describe how time and weathering affect properties of soil
- Examine how climate affects the development of soil
- Analyze soil/media limitations related to crop production, greenhouse production and/or landscape utilization
- Explain moisture-holding capacity
- Explain what determines a soil's moisture-holding capacity
- Examine the difference between soil, soil-less media and hydroponics
- Examine the effects of media components on plant growth

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

### 3. Plant seeds, seedlings, or cuttings

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains seeds, seedlings, or cuttings to be planted
- Removes any plastic or paper pots
- Cracks peat pots
- Determines spacing of plants
- Add seeds, seedlings, or cuttings as required to appropriate depths
- Adds any nutrient mix or solution as required
- Covers with fine soil/media
- Waters generously with a gentle spray or mist
- Stores or discards any leftover seed as required

Learning Objectives

#### PLANT BASICS

- Describe the components of a plant cell and explain their functions
- Identify and describe the basic types of plant cells
- Define basic Mendelian principles: dominance, recessive, incomplete dominance, etc.
- Discuss the importance of improved organisms in agriculture
- Identify methods used in agriscience to improve organisms
- Describe plant taxonomy and hierarchical classification
- Explain plant nomenclature

#### ROOTS

- Describe the parts and functions of roots
- Explain root growth
- Describe how roots absorb water and nutrients
- Recognize the characteristics of a healthy root system

#### STEMS

- Describe the parts and functions of a stem
- Compare types of specialized stems
- Explain factors involved in translocation

#### LEAVES

- Identify the parts and functions of leaves
- Identify and describe the patterns of leaf arrangement

#### FLOWERS

- Identify the parts of flowers and explain their functions
- Compare and contrast types of flowers

#### FRUIT

- Define fruit and describe its functions
- Compare and contrast the basic types of fruits
- Describe fruit development
- Identify the parts of a fruit
- Describe how seedless fruits are produced

#### SEEDS

- List the parts of a seed
- Describe the process of seed germination
- Discuss the conditions required for seed germination
- Explain the importance of seed quality

#### **Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 4. Monitor plants for light, moisture, and temperature requirements

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Periodically checks the planting spaces as required
- Prior to germination, keeps seeds thoroughly watered
- After germination, pulls any excess seedlings
- Waters during dry periods
- Covers during frost periods
- Controls weeds by pulling, mulching, etc.
- Monitors plants for insects and disease signs
- After harvesting, removes spent plant debris into compost

Learning Objectives

- Explain the growth processes of photosynthesis, respirations and transpiration

LIGHT

- Examine the role of chloroplasts and plant pigments in photosynthesis
- Analyze the major steps involved in photosynthesis
- Identify factors that affect photosynthesis
- Describe the role of the sun, sugar, oxygen, carbon dioxide, and water in photosynthesis
- Describe the effects of light quality, quantity and duration on plant growth

CELL RESPIRATION

- Describe the respiration process in the breakdown of food and organic matter
- Identify factors that affect cellular respiration

TEMPERATURE

- Discuss the effect of temperature on plant growth
- Describe plant responses to temperature
- Explain cardinal temperature range for growth and survival of common plants
- Explain plant hardiness and heat tolerance

MOISTURE

- Identify important characteristics of water
- Explain the hydrologic cycle
- Describe the functions of water in plant growth
- Explain plant responses to water shortage and to excess water

OTHER

- Compare annual, biennial and perennial life cycles
- Explain growing degree days
- Calculate growing degree days
- Explain the effects of humidity on plant growth

- Discuss the effects of air pollution on plant growth

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 5. Assist to install and maintain watering and/or irrigation systems

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Determines irrigation requirements
- Verifies local building codes that must be followed
- Ensures utility companies have pre-marked locations of buried utility lines
- Reviews manufacturer procedures for the watering/irrigation system chosen
- Sketches or plans locations of watering heads in accordance with types of plantings, buried utility lines, plant irrigation needs, and existing property structures
- Determines water pressure from water source using a water pressure gauge
- Checks the flow rate by calculating gallons per minute or applicable
- Finds spacing of watering heads
- Determines number of watering heads based on head ratings and water source calculations
- Establishes sprinkler circuits and install valves
- Locates controllers and size wiring
- Installs and connects pipes, tubing, watering heads, etc. as required for the type of system
- Monitors and checks system periodically as required by facility or system manufacturer

Learning Objectives

- Compare water delivery and irrigation methods and options
- Determine the need for drainage and describe the benefits of tile drainage
- Examine subsurface drainage techniques and determine the equipment and types of pipe available
- Describe the benefits of irrigation
- Identify ways of determining the need of irrigation
- Describe irrigation scheduling
- Explain methods of water application
- Describe the efficient use of water
- Identify sources of soil water depletion
- Describe soil conditions conducive to artificial drainage
- Describe soil conditions conducive to irrigation
- Explain how watering systems are chosen based on planting space shape, type of plants, adaptability and cost
- List contaminants in water that come from agriculture
- Describe how agricultural practices affect drinking water quality

- Describe how agricultural chemicals and sediments move to off-site areas
- Explain how nitrogen and phosphorus affect surface and ground water quality
- Explain the purposes of filter/buffer strips and riparian areas/tree plantings on water quality

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 6. Mix fertilizers and additives

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Determines the nutrient requirements based on soil report with worksite professional
- Calculates the proper amount and type of fertilizer to apply for the soil and type of plants to be grown with worksite professional
- Reviews the safety requirements for the mixing procedure
- Wears any appropriate PPE
- Obtains the appropriate equipment, supplies and fertilizers/additives
- Mixes the fertilizer ingredients in the appropriate ratios using the appropriate containers
- Labels fertilizer mixture
- Documents mixing process
- Cleans equipment
- Discards any excess disposable materials as required

Learning Objectives

- Define nutrient
- Discuss the role of the essential nutrients in plant growth
- Compare types, uses, and applications of fertilizers
- Identify non-fertilizer nutrients and describe their functions
- Identify macro and micronutrients and describe their functions
- Describe the meaning and importance of soil fertility
- Define pH and discuss its role in plant nutrition
- Describe environmental conditions that influence nutrient deficiencies
- Explain the development of a nutrient management plan
- Describe organic and inorganic fertilizers
- Explain fertilizer analysis, grade, and ratio
- Explain the mixing of fertilizers
- Describe the selection of fertilizers
- Identify classes of plant growth regulators
- Discuss how and why synthetic growth regulators are used
- Describe commercial uses of plant growth regulators

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 7. Apply fertilizers

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Checks the facility fertilization plan
- Determines the need for the application of fertilizer
- Mixes the fertilizers and additives
- Reviews any safety requirements for the application procedure
- Wears any appropriate PPE
- Obtains the appropriate equipment, supplies and fertilizers mixtures
- Identifies the most appropriate method of fertilizer application
- Determines the appropriate fertilizer application rate
- Fertilizes the plants as required
- Documents fertilization process
- Cleans equipment
- Discards or stores any excess fertilizer as required

Learning Objectives

- Examine the equipment and technology used to apply fertilizers
- Identify forms of nitrogen and describe their characteristics
- Identify and describe the symptoms of nitrogen deficiency and nitrogen toxicity
- Describe the nitrogen cycle and explain how it influences the availability of nitrogen to plants
- Identify plants capable of nitrogen fixation and describe factors that influence nitrogen fixation
- Identify and describe natural and synthetic fertilizer sources of nitrogen
- Identify the forms of phosphorus in soil
- Examine factors that affect phosphorus availability
- Identify and describe symptoms of phosphorus deficiency and phosphorus toxicity
- Identify and describe fertilizer sources of phosphorus
- Describe the availability of potassium to plants
- Identify and describe symptoms of potassium deficiency and potassium toxicity
- Identify and describe the fertilizer sources of potassium
- Identify the forms of calcium, magnesium, and sulfur in soil and identify their fertilizer sources
- Identify the fertilizer sources of micronutrients
- Identify and describe symptoms of nutrient deficiency and toxicity from secondary macronutrients and micronutrients

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 8. Manage inventory

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Checks incoming items for damage
- Verifies incoming items match purchase order and description
- Notifies appropriate parties and take corrective action when defective items are identified
- Monitors location of items
- Monitors inventory use for ordering levels
- Assists worksite professional to perform inventory checks
- Checks that proper inventory levels are maintained
- Rotates items to minimize old and outdated inventory
- Performs inventory counts
- Assists with inventory inaccuracies investigations
- Documents inventory activities

Learning Objectives

- Explain the purpose of an inventory plan
- Identify the costs of maintaining inventory
- List methods of productivity measurement and just-in-time inventory control
- Explain the importance of maintaining inventory levels to minimize inventory value
- Discuss the timing of inventory audits to production requirements
- Describe your facility's policy in the event of inventory shortage
- List examples of situations that indicate the need for a review of storage and retrieval systems to determine if upgrades and replacement are warranted

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 9. Maintain agribusiness records

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Selects appropriate forms/records
- Labels and/or codes documents as required
- Files forms/records in appropriate location
- Retrieves and replaces files in correct position
- Adds, Edits, Verifies and Queries data in electronic files if applicable
- Uses appropriate computer codes, formatting, macros, charts, spreadsheets, etc.
- Verifies data prior to entry/storage
- Maintains files as required

Learning Objectives

- Describe the functions of business records
- Identify common kinds of business records
- Define terms used in horticulture records
- Discuss common legal forms used in horticulture services
- Explain why record keeping is necessary to assess the current financial condition of a business and why it is helpful in planning and preparing for the future
- Identify and describe the characteristics of good record keeping
- Compare manual and electronic record keeping systems
- Demonstrate how electronic data is manipulated such as in a spreadsheet system
- Explain how data & files are stored and “backed up”
- Describe the purpose of security and ID information within record keeping systems

**Comments:**

## Unit 6: Plant Pathway

### Plant Basics

Competency

#### 10. Evaluate the facility business and marketing plan

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite OR in the classroom in a simulated setting
- NOTE: A simulated setting should ONLY be used IF there is no possibility of skill performance at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies the goals and objectives for the business
- Verifies records are kept and maintained on finances, production, plant health, harvest, and sales as required
- Identifies what products are for sale
- Identifies pricing goals
- Describes how product will be merchandised
- Evaluates cost of production
- Evaluates pricing opportunities (cash, futures, options)
- Evaluates pricing indicators (supply & demand)
- Reviews the strategy for evaluating and updating the marketing plan
- Identifies markets for selling products

Learning Objectives

- Define agribusiness and describe the sectors of agribusiness
- Identify and describe basic categories of resources, and explain why each is necessary to produce a product
- Explain factors that determine the ability of a business to start successfully
- List and explain the factors that typically contribute to the success and failure of agribusinesses
- Explain the purpose and importance of a business plan
- Describe the parts of a business plan
- Appraise and evaluate the economic value of certain crops and plants for various applications in the agriculture industry
- Review pricing methods
- Explain how to price that includes a reasonable return on investment
- Relate production size to costs
- Calculate various costs- planting, soils, fertilizers, watering, maintenance costs
- Define marketing and the marketing mix
- Define the purpose for developing a marketing plan
- Explain the essential elements of a marketing program
- List marketable plant products and byproducts
- Compare organic plant industry to traditional plant production

**Comments:**

# **Appendix O**

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **PLANT PATHWAY CROPS UNIT UNIT 7**

## Unit 7: Plant Pathway Crops

Competency

### 1. Assist to plan crop from rotation schedule

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews past crop history by crop, sequence of botanical families, performance, production, logistics issues
- Considers field needs and conditions of disease and/or fertility
- Considers companion planting options
- Considers harvest logistics
- Determines field locations of most-profitable, beneficial, and/or at risk crops
- Determines field locations of lower priority crops
- Groups crops according to botanical families
- Groups crops according to maturity dates for simultaneous or sequential harvesting
- Determines crop quantities
- Schedules succession plantings of cash crops
- Determines cover crop types, field locations, and quantities
- Integrates cash & cover crops
- Determines managed fallow field locations

Learning Objectives

- Define land capability and describe ways to improve it
- Identify factors that determine land capability

**CORN**

- Identify the types of corn and their uses
- Identify and describe the parts of a mature corn plant
- Identify and describe the components of a corn seed
- Compare and contrast the characteristics of corn varieties

**WHEAT/GRAINS**

- Identify the types of wheat
- Determine the uses of wheat
- Identify and describe the parts of a mature wheat head
- Compare and contrast the types of wheat flour
- Describe the characteristics used for the selection of wheat varieties
- Compare and contrast oats, barley, and rye, and determine their uses

**SOY**

- Identify the different types of soybeans
- Determine the many uses of soybeans
- Identify and describe the parts of a mature soybean plant

- Identify and describe the components of a soybean seed
- Compare and contrast the characteristics of various soybean varieties
- Examine the soybean seed selection process

#### OILS

- Compare and contrast vegetable oils from soybeans, corn, sunflowers, canola, and peanuts
- Determine the use of valuable byproducts of the oil extraction process

#### FORAGE

- Compare and contrast the common types of forage grasses and legumes
- Determine the steps involved in the hay-making process
- Describe the forage quality standards and explain their importance

#### FIBER

- Compare cotton to other fiber crops

#### VEGETABLES

- Describe the characteristics of potatoes, sweet corn, snap beans, cabbage, and other vegetable crops

#### FRUITS

- Explain how to prepare and plant small fruits
- Explain how to plan and lay out an orchard
- Describe how fruit trees should be planted

#### **Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 2. Till and test the soil

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

TILL

- Reviews the safety procedures for tilling the soil
- Adjusts and calibrates equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Sets up chisel plow OR Disc OR other
- Adjusts depth of disc AND adjust disc for level operation
- Performs periodic checks to determine accurate depth and angle of chisel OR specific depth of disc is achieved
- Adjusts machinery after periodic checks
- Completes plowing as assigned
- Documents tillage
- Cleans equipment
- Identifies field conditions and report back to worksite professional

TEST

- Checks fertilization plan for testing the soil
- Collects samples of soil/media and/or plant tissue
- Assists worksite professional to test or send sample for soil testing
- Interprets test results of soil/media and/or plant tissue with worksite professional
- Notes deficiencies of nitrogen, phosphorus, potassium, pH, etc.
- Determines mix of fertilizers needed based on soil report with worksite professional
- **Mixes fertilizers and additives**

Learning Objectives

- Describe the safety processes for tilling soil
- Explain why tillage is used in crop production
- Describe tillage methods and their purpose
- Discuss the relationship between tillage systems and soil loss or compaction
- Describe the impact of tillage systems on soil fertility and pest management
- Explain the production practices involved in the seedbed preparation and planting of corn, wheat/grains, and soybeans
- Explain how soils within a profile change over time
- Explain the role of organic matter, soil depth, surface slope, soil organisms, and nutrient balance in soil productivity

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 3. Plant crops

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews rotation and production plans
- Prepares planting and irrigation equipment
- Orders seeds and supplies
- Monitors weather for best day to plant
- **Tills and tests soil** at appropriate times using appropriate tillage
- Adjusts and calibrates equipment according to facility requirements
- Wears any required PPE
- Loads hopper(s) OR other with seeds and fertilizers and additives in appropriate containers. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Starts GPS application job if applicable
- Periodically verifies planting depth and number of seeds per acre
- Adjusts depth/number of seeds/acres accordingly
- Completes acreage
- Completes GPS application
- Documents planting map and operation
- Removes excess seed and fertilizer from equipment
- Keeps unused soil covered with cover crops, mulch, trap crops
- Documents time, location, and types of crops on fields

Learning Objectives

- Describe the safety processes for planting crops
- Explain how to monitor and verify planting depth and seed number while planting
- Discuss how to choose appropriate seed quality for planting
- Explain the importance of spatial mapping
- Discuss the concept and principles of spatial mapping
- Describe equipment used for spatial mapping
- List techniques used to spatially map
- Explain the application of GIS/GPS systems with map development output
- Explain how planting preparation differs across geographical areas

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 4. Assist to maintain and monitor crops

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Walks fields regularly to observe crop growth and field conditions
- Scouts for weeds, insects and plant diseases
- Tests soils
- Evaluates records and current information and maps on crops and fields
  - Study existing data on pests, diseases, cover crops, fertility etc.
  - Consult field records for previous years' successes and failures
  - Consult meteorological data
  - Create field maps which include items such as acreage, soils, physical characteristics, frost pockets, air damage and microclimates
- Plots areas with known problems on map
- Analyzes data collected to determine actions to be taken
- Adjusts actions based on field and crop conditions for pest spraying, irrigating, fertilizing, etc. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Documents actions taken and results of action

Learning Objectives

- Identify basic principles of crop monitoring
- Describe proper sampling techniques used when monitoring field crops
- Describe the process of scouting for weeds, insects, and plant diseases
- Examine the developmental stages of a corn plant, and determine factors that affect each stage
- Determine the nutrient and climatic requirements of wheat/grains
- Identify and describe the growth stages of a wheat plant and determine factors that affect each stage
- Examine the development stages of a soybean plant
- Analyze the phases of perennial grass growth
- Analyze the stages of forage legume growth
- Describe how forage crops are established and maintained
- Describe the maintenance of a small fruit planting
- Discuss how to maintain the orchard

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 5. Assist to prevent the spread of weeds, pests, and diseases

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies plant pests (e.g., insects, diseases, weeds, rodents)
- Determines pest management safety practices and methods to be used
- Implements pest control plan with appropriate treatments
- Documents pest identity and control actions taken

**INSECTS/RODENTS/DISEASES**

- Arranges for pesticide application or apply pesticide if licensed. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).

**WEED CONTROL by row cultivation**

- Row cultivates field to prevent weeds
- Adjusts and calibrates equipment row cultivator to facility requirements
- Wears any required PPE
- Performs test run
- Verifies soil is cultivated to specified depth and desired weed control is achieved
- Adjusts depth of cultivator
- Completes field
- Cleans equipment
- Documents row cultivation

Learning Objectives

- Identify common weeds, insects, nematodes, and diseases that affect corn, wheat, soybeans and forages

**PESTS**

- Identify and describe types of pests
- Describe how pests affect plants and cause economic losses
- Define integrated pest management (IPM) and keys to a successful IPM program
- Compare and contrast the methods used in IPM to control pest problems

**PESTICIDES**

- Define toxicity
- Identify the major classifications of pesticides, and describe how they are used
- Identify the information that should be included on the pesticide label
- Identify the safety practices that should be followed when applying pesticides
- Identify the environmental concerns involved with pesticide use
- Explain pesticide persistence and its impact on the environment

**WEEDS**

- Define weed and explain how weeds affect crops and pasture
- Determine how vegetative characteristics are used to identify weeds
- Identify common weeds in crop production
- Discover how weeds are spread
- Describe methods of weed control
- Describe the types of herbicides

#### INSECTS

- Identify and classify common insects
- Identify insect damage signs
- Describe the biological characteristics of insects
- Compare and contrast the types of insect life cycles
- Explain how insects damage plants
- Describe methods of insect control
- Describe the types of insecticides

#### DISEASES

- Identify and describe the agents that cause infectious and non-infectious plant diseases
- List conditions that are necessary for disease problems
- List and describe common plant diseases caused by bacteria
- Examine methods used to control bacterial diseases
- Describe how fungi diseases are spread
- Examine methods used to control diseases caused by fungi
- List and describe common plant diseases caused by fungi
- Identify symptoms associated with fungi diseases
- Describe common viral plant diseases
- Identify symptoms of viral diseases
- Describe how viral diseases are spread
- Examine methods used to control viral plant diseases
- Identify symptoms of diseases caused by nematodes
- Examine methods used to control the impact from nematodes

#### Comments:

## Unit 7: Plant Pathway Crops

Competency

### 6. Harvest crop product

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Verifies product is ready for harvest based on facility requirements
- Reviews the safety procedures for harvesting
- Adjusts and calibrates any harvest/combine equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)

**AUTOMATED HARVESTS**

- Starts GPS application job if applicable
- Completes a test run
- Walks harvested area of the field to observe machine and header loss
- Makes appropriate adjustments to minimize crop loss
- Continues to harvest
- Off loads to a transport vehicle
- Repeats steps harvest checks and adjustments until the field is harvested
- Completes the GPS application
- Documents harvest map and operation
- Cleans and prepares equipment for next harvest location as required

**MANUAL HARVEST**

- Harvests only product that is mature
- Picks and handles the product carefully to prevent unnecessary damage
- Off loads product to collection containers
- Documents picking
- Cleans equipment

Learning Objectives

- Describe the safety processes for harvesting crops
- Identify harvesting methods and equipment
- Describe factors that influence harvest time including moisture content, hybrid or variety characteristics, product end use and weather
- Explain how to determine crop maturity for corn, wheat and soybeans
- Calculate yield estimates and determine harvest loss
- Estimate the fixed and variable costs to produce an acre of crop
- Determine factors that affect the profitability of crop production
- Examine the effects of wheat shattering
- Describe the vegetable oil extraction process
- Identify harvesting and marketing systems for small fruits

- Explain when and how to harvest tree fruit

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 7. Assist to transport and unload crop

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies and adheres to all related safety standards/regulations
- Determines load capacities and license restrictions of transport vehicle
- Secures load
- Checks load
- Verifies destination
- Transports product to destination
- Weighs transport vehicle prior to unloading, if applicable
- Transfers harvested product to sorting/storage area as required
- Weighs empty transport vehicle, if applicable
- Documents transport and delivery of product with weigh in and weigh out as applicable

Learning Objectives

- Describe safety processes for loading, transporting and unloading crops
- List regulations pertaining to loading/unloading of crops
- Describe different kinds of loading equipment and their applicable safety and regulatory use standards
- Discuss the function of verification at the loading/shipping stage
- List common types of transportation vehicles used for different types of agricultural crops
- Describe storage conditions for transportation required for the crops you work with
- Explain the importance of efficient transportation of crops
- Compare processes for transporting and unloading grain crops, fruit crops and vegetable crops

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 8. Inspect, sort, and store product

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the safety procedures for sorting and storing
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Sorts through the product prior to storage and removes damaged or diseased product immediately if required
- Confirms that products conform to specified requirements
- If applicable, processes and grades the product prior to shipments for sale or further processing
- Stores product as required for humidity, temperature and in appropriate containers for maximum storage life

**GRAIN DRYING**

- Obtains representative sample
- Calculates moisture content
- Determines amount of time needed for drying
- Operates dryers according to manufacturer's guidelines
- Rechecks moisture content
- Continues process until grain is dried to within to desired level
- Moves grain to storage bin
- Samples grain for insect, mold and rodent damage
  - Insert probe and withdraw sample and inspect for damage
  - Scout interior and exterior of storage bin
  - Report conditions to worksite professional
- Records and documents all drying activities

Learning Objectives

- Compare storage methods for crops
- Describe techniques for grading, handling and packaging crops for distribution
- Describe factors that influence crop quality in storage including temperature, moisture, aeration, pests, crop condition, post-harvest handling and length of storage
- Describe how to maintain purity of an identity-preserved (IP) crop
- Describe the rationale and process for drying grains
- List other post-harvest activities that may occur for fruit, grains, and vegetables
- Discuss the role of the FDA and FDA food storage regulations for maintaining quality product

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 9. Operate crop equipment & machinery safely

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Operates only equipment that he/she is trained on
- Verifies tool/equipment is available for use and in working order
- Verifies tool/equipment is current for preventative maintenance and/or calibration
- Verifies safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use
- Inspects tool/equipment and work area for safety considerations
- Sets up and prepares tool/equipment for safe operation including lubrication and fluid level checks
- Wears the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment
- Operates tool/equipment safely with guarding devices if applicable in the manner required for the job task
- Monitors tool/equipment for safe operation while operating
- Follows procedures for clean up and shut down after use
- Investigates and promptly reports abnormal tool/equipment conditions
- Shuts down and label any tool/equipment that is not operating as expected, if applicable
- Stores tools

Learning Objectives

- List the various tools and equipment used at your worksite such as farm vehicles, crop processing vehicles and equipment, cutting and non-cutting hand tools, sawing machines, diagnostic tools, etc.
- Outline applications of each tool and equipment
- Demonstrate the proper usage of a tool or piece of equipment
- Describe and demonstrate the safety requirements for each tool and equipment
- Discuss start up and shut down procedures for each tool/equipment you will operate
- Describe emergency shutdown procedures for the tool/equipment you will operate
- Describe the characteristics of a tool in need of maintenance
- Explain how to recognize and address malfunctions for the tool/equipment you will operate
- Describe how to recognize wear and tear on equipment components
- Describe regulations for the use of tools and equipment at your facility
- Explain Lock Out/Tag Out indications and procedures
- Compare various crop production tools such as those used for chisel plowing, disc cultivation, combine harvesters, and cultivating & unloading augers

- Identify equipment and structures used to handle, transport, and store corn, wheat/grains, soybean, hay and forage products

**Comments:**

## Unit 7: Plant Pathway Crops

Competency

### 10. Clean and service equipment & machinery

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Performs required cleaning and preventive maintenance (PM) on equipment as required by schedule
- Reviews safety requirements and PM procedures first
- Sets up and prepares tool/equipment for safe operation including lubrication and fluid level checks
- Maintains fluid levels
- Calibrates metering, monitoring, and sensing equipment
- Refers to technical information manuals for inoperative equipment
- Checks correct amount and types of lubricant, fuel amount, coolant amount, belt tension, temperatures, pressures, gaskets & seals, leaks, etc.
- Arranges for service of vehicles as needed with worksite professional

Learning Objectives

- Define preventative maintenance
- List common agricultural equipment and machinery requirements
- Demonstrate how to replace tool parts and components as needed
- List which tools and equipment require calibration and/or safety certification
- Describe how to use the repair manual to apply repairs and look up parts information
- Discuss the safe operation of 2 stroke and 4 stroke cycle engines
- Describe engine systems and components
- Compare engine cooling, electrical and fuel systems
- Describe physical principles of operations of hydraulic systems
- Describe the general operation of electrical systems (circuits design, starting, charging, and safety circuits)

**Comments:**

# **Appendix P**

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **PLANT PATHWAY GREENHOUSE/FLORAL UNIT UNIT 8**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 1. Service customers

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Becomes familiar with product lines and any applicable information to assist the customer in choosing a product
- ***Demonstrates customer service skills***
- Greets and assists guests
- Uses effective sales techniques with customers such as focusing on customer needs and priorities
- Responds to dissatisfied guests
- Assists guests by telephone if applicable

Learning Objectives

- Research & list effective sales techniques
- Identify the steps of the selling process
- Name methods for making the initial approach in retail sales
- Identify product information in the use of selling
- Describe ways to determine customer needs
- List common objections to purchasing
- Explain how to address customer objections
- Explain how a theme might determine the types of products/services/events available

**Comments:**

## **Unit 8: Plant Pathway Greenhouse/Floral**

Competency

### **2. Process sales**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Calculates total sale purchase, including taxes, accurately
- Accepts cash payments
- Accepts credit card transactions
- Gives customer correct change
- Thanks guests
- Operates a POS (point of sale) system and/or cash register
- Balances end of shift transactions

Learning Objectives

- Describe how to process cash and credit cards using a POS and cash register
- Demonstrate how to calculate and hand back cash change without a calculator
- Describe end of shift audit procedures
- Explain how sales are recorded for cash collected and paid out of a cash drawer
- Explain how cash banks are issued to cashiers
- Describe how cashiers turn in cash banks and prepare cash deposits
- Explain how cash banks and cashier cash deposits are reconciled

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 3. Assist to design crop plantings, displays, and/or floral arrangements

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

DISPLAYS

- Constructs or assembles displays and display components
- Stocks and maintains displays
- Changes or rotates window displays, interior display areas, and signage to reflect changes in inventory, season, or promotion

CROP PLANTINGS

- Creates crop planting design plan based on past sales, customer requirements, and site capacity
- Utilizes design elements of line, form, texture, and color to express visual effect
- Determines plants, trees, hardscaping, moisture, fertilizer, soil, equipment and power requirements for crop
- Determines a crop planting design for seasonal displays of foliage, plants, and flowers
- Documents design elements and decisions made for crop growth
- Develops crop planting plan based on design

FLORAL DISPLAYS/BOUQUETS, ETC

- Assembles the required flowers into bouquets, boutonnières, centerpieces, vases, wreaths, etc.
- Applies basic design principles to product
- Handles and arranges cut flowers appropriately

Learning Objectives

- List and define terms associated with nursery/floral design
- Identify design elements
- Discuss applications of art in horticulture and landscaping
- Discuss principles of design that form the basis for visual impression
- Define the categories of nursery plants
- List common hardscaping materials used in nurseries

DISPLAYS

- Explain how retail displays are used in marketing retail items
- Describe types of display arrangements

FLORALS

- Analyze the principles of floral design

- Explain how the concept of proportion, balance, dominance, focal point and rhythm are applied to floral design
- Explain how flowers incorporate space, depth, texture and color in floral design
- Distinguish between an annual and a perennial
- Describe how to design a flower garden
- Describe proper handling and preparation of cut flowers
- Explain how to bundle cut flowers for bouquets, boutonnieres, vases, wreaths, etc.
- Describe the major forms used in floral design
- Identify cutting tools used in floral design
- Recognize floral design supplies for centerpieces, sprays, and vase arrangements
- Describe floral design supplies for corsages, bouquets, and boutonnieres
- Describe designing with everlasting plant materials (dried and silk)

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 4. Implement crop planting plan

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the planting and safety procedures
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- **Prepares planting spaces**
- **Prepares soils/media**
- **Plants seeds, seedlings, or cuttings**
  - Grows liners from seed
  - Grows liners from cuttings
  - Grows liners from divisions
  - Sows grass seed or plants plugs of grass
- Transplants liners
- **Monitors crop plantings**
- **Mixes fertilizers and additives**
- **Applies fertilizers**
- Pinches crop plantings as required
- Spaces crop plantings
- Forces bulbs
- Transplants to pots
- Harvests flowers

Learning Objectives

- Contrast the different types of nursery facilities
- Demonstrate how the plant-hardiness zone map and the plant heat-zone map are used
- Describe automated systems involved in planting
- Describe the process of lining out nursery stock
- Examine the field practice schedules for different types of plants
- Describe the process of flowering, pollination, fertilization and fruit development in plants in general
- Explain the role of the shoot in propagation, branching and plant form
- Compare development of grassy versus broad leaf plants
- Compare sexual and asexual propagation
- Distinguish between bulbs, corms, tubers, and rhizomes
- Discuss production practices used in growing foliage plants in the greenhouse
- Explain practices used in caring for foliage plants in the home or office
- Examine the factors involved in getting bedding plants started

- Explain production practices used in growing bedding plants
- Discuss the factors involved in propagating perennials
- Examine production practices used in forcing perennial plants to flower
- Analyze when and how to harvest everlasting flowers
- Demonstrate the proper staking of a tree in the field

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 5. Assist to maintain and monitor crop plantings

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the monitoring requirements for the particular crop planting
- WATER
- **Assists to install and maintain watering and/or irrigation systems**
  - Calibrates watering equipment
  - Applies correct amounts of water based on water holding capacity of media and crop water needs

GREENHOUSE ENVIRONMENT

- Monitors temperature, light, humidity and air controls
- Adjusts as required for crop needs

OBSERVE

- **Assists to regularly monitor crop plantings** growth and conditions
- Takes soil, media, and plant samples as required
- Scouts for weeds, insects and plant diseases
- Adjusts actions based on crop plantings conditions for pest spraying, irrigating, fertilizing, etc. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Documents actions taken and results of action

Learning Objectives

- Identify basic principles of plant monitoring and management of common horticultural crops in nurseries
- Describe methods of heating greenhouse structures
- Contrast major greenhouse cooling and ventilation systems
- Discuss how energy curtains are used to maintain greenhouse temperatures
- Discuss the advantages of automated systems
- Identify automated systems involved in moving plants in the greenhouse
- Compare automated systems involved in watering plants
- Describe proper sampling techniques used when monitoring nursery plants
- Examine the developmental stages of a common floral plant, and determine factors that affect each stage
- Examine the developmental stages of a common green plant, and determine factors that affect each stage
- Describe the process of scouting for weeds, insects, and plant diseases

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 6. Assist to prevent the spread of weeds, pests, and diseases

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the pest reduction and safety procedures
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Identifies plant pests (e.g., insects, diseases, weeds, rodents)
- Determines pest management safety practices and methods to be used
- Implements pest control plan with appropriate treatments
- Documents pest identity and control actions taken

**INSECTS/RODENTS/DISEASES**

- Arranges for pesticide application or apply pesticide if licensed. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).

Learning Objectives

- Identify common weeds, insects, and diseases that affect greenhouse nurseries

**PESTS**

- Identify and describe types of pests
- Describe how pests affect plants and cause economic losses
- Define integrated pest management (IPM) and keys to a successful IPM program
- Compare and contrast the methods used in IPM to control pest problems

**PESTICIDES**

- Define toxicity
- Identify the major classifications of pesticides, and describe how they are used
- Identify the information that should be included on the pesticide label
- Identify the safety practices that should be followed when applying pesticides
- Identify the environmental concerns involved with pesticide use
- Explain pesticide persistence and its impact on the environment

**WEEDS**

- Define weed and explain how weeds affect crop plantings
- Determine how vegetative characteristics are used to identify weeds
- Identify common weeds in nursery production
- Discover how weeds are spread
- Describe methods of weed control
- Describe the types of herbicides

**INSECTS**

- Identify and classify insects

- Identify insect damage signs
- Describe the biological characteristics of insects
- Compare and contrast the types of insect life cycles
- Explain how insects damage plants
- Describe methods of insect control
- Describe the types of insecticides

#### DISEASES

- Identify and describe the agents that cause infectious and non-infectious plant diseases
- List conditions that are necessary for disease problems
- List and describe common plant diseases caused by bacteria
- Examine methods used to control bacterial diseases
- Describe how fungi diseases are spread
- Examine methods used to control diseases caused by fungi
- List and describe common plant diseases caused by fungi
- Identify symptoms associated with fungi diseases
- Describe common viral plant diseases
- Identify symptoms of viral diseases
- Describe how viral diseases are spread
- Examine methods used to control viral plant diseases

#### **Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 7. Perform sanitization procedures

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the sanitization and safety procedures
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Regularly and thoroughly cleans floor of soil, organic matter and weeds
- Installs physical weed mat barriers on dirt and gravel floors
- Disinfects benches and bench tops
- Discards old OR disinfects reusable pots, flats and trays
- Cleans hose ends and stores hose ends off the ground
- Verifies growing media is covered and area is clean
- Cleans media mixing area routinely of plant material, contaminated pots, and used media
- Disinfects the growing and plant holding area
- Disinfects the irrigation system

Learning Objectives

- List common plant diseases found in nursery environments
- Describe the importance of a nursery sanitation plant
- Discuss the timing and cleaning schedule for sanitation at your facility to prevent diseases
- Describe factors that contribute to a microbe friendly environment in a nursery
- Explain the best times to conduct sanitation procedures in a nursery/greenhouse
- Discuss common disinfectants and sanitizers used in greenhouse nurseries
- Describe how to manage algae and other fungi
- Explain how improper watering can lead to algae growth
- Explain the process for cleaning irrigation systems
- Explain why wood structures are not recommended in greenhouse nurseries

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 8. Prepare, sort, and store products

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the product preparation requirements
- Sorts through the product and remove damaged or diseased product immediately if required
- Confirms that products conform to specified requirements
- If applicable, processes and grades the product prior to shipments for sale or further processing
  - Cuts, rolls and stacks sod
  - Dips cut flowers, counts into bunches and ties
  - Wraps plant, tree, shrub roots
  - Harvests plants and pot
- Stores product as required for humidity, temperature and in appropriate containers for maximum storage life
- Documents inspection, sorting and storage activities

Learning Objectives

- Compare storage requirements for different plantings
- Describe techniques for inspecting, grading, handling and storing nursery crops for distribution
- Demonstrate the process of grading with a caliper
- Describe the types of storage used for nursery stock
- Describe the techniques used in the defoliation of plants before storage
- List and describe the problems that might occur to plants in storage
- Compare processing techniques for cut flowers, potted plants, trees/shrubs, and grass/sod
- Describe factors that influence plant quality in storage including temperature, moisture, aeration, pests, handling and length of storage
- Explain the basic requirements of cut flowers
- Understand the causes of deterioration and death of flowers
- Describe the steps of effective conditioning of flowers and foliage
- Explain the importance of using floral preservatives

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 9. Fill and package orders

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the packaging and safety procedures for inspecting and sorting
- Adjusts and calibrates any equipment according to facility requirements
- Wears any required Personal Protective Equipment (PPE)
- Determine storage location of items needed
- Pulls items from storage location
- Verifies item pulled matches description and location of item required
- Notifies appropriate worksite professional of any discrepancies
- Prioritizes orders to be filled based on order plan
- Folds and prepares boxes for packaging
- Follows packaging plan for crop plantings into flats, trays and boxes
- Uses packaging methods that keep returns and claims for damage to a minimum
- Verifies that outgoing labels have all relevant information
- Confirms numbers of crop plantings packaged
- Checks container to verify that packing has proper labeling and meets shipping and safety regulations
- Notifies worksite professional when defective contents are identified
- Prepares packing slip
- Compares packing slip TO order and materials to be shipped
- Resolves any discrepancies

Learning Objectives

- Compare different storage and packing areas and their function
- Describe common labels used on crops to be readied for packaging
- Demonstrate the use of scanners and scales for inventory management and counting
- List common markings found on cartons/containers
- Explain basic guidelines for labeling
- List common types of information on a packing slip
- Examine commercial packing and shipping
- Explain the methods of preserving plant materials
- Differentiate the three types of packaging of nursery crops
- Discuss the advantages and disadvantages of bare root, balled-and burlapped, and containerized packaging
- Describe how to ball-and-burlap stock properly

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 10. Load product for sale, delivery, or further distribution

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies and adheres to all related safety standards/regulations
- Loads orders safely
- Uses any loading equipment safely and according to regulations
- Determines load capacities of transport vehicle
- Loads transportation equipment according to load capacity
- Packs transportation vehicles to ensure no damage to shipment
- Secures load
- Checks load
- Verifies destination
- Documents loading and transport of product as applicable
- Updates inventory records as required

Learning Objectives

- Describe safety processes for loading, transporting and unloading
- List the regulations pertaining to loading/unloading of materials and supplies
- Describe different kinds of loading equipment and their applicable safety and regulatory use standards
- Discuss the function of verification at the loading/shipping stage
- Explain how loading plans are created for different types of transportation equipment
- List common types of transportation vehicles used for different types of nursery crops
- Describe storage conditions for transportation required for the nursery crops you work with
- Explain the importance of efficient transportation of nursery crops
- Compare processes for transporting and unloading different types of nursery crops

**Comments:**

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 11. Assist to maintain facility & equipment

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

PREVENTATIVE MAINTENANCE (PM)

- Performs routine preventative maintenance (PM) according to facility schedule
- Communicates scheduled PM to management
- Assures that alternative equipment is available if needed
- Gathers supplies to perform PM
- Ensures that equipment is properly labeled and pulled from use
- Follows appropriate Lock Out/Tag Out procedures prior to performing PM
- Follows all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
- Assists worksite professional to follow PM schedule to calibrate and maintain equipment, tools and workstations
- Assists worksite professional to re-qualify equipment for operation
- Cleans up area after PM
- Documents preventative actions taken

REPAIR

- Assures that alternative equipment is available if needed
- Consults worksite professionals, maintenance manuals, and equipment history to diagnose possible equipment problems
- Gathers supplies to perform repair
- Ensures that equipment is properly labeled and pulled from use
- Follows appropriate Lock Out/Tag Out procedures prior to performing repair
- Follows all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
- Assists worksite professional to isolate system and component failure and to repair equipment problems
- Assists worksite professional to identify root cause of problem and develop corrective action plan
- Assist worksite professional to re-qualify equipment for operation
- Cleans up area after repair
- Documents repairs completed
- Evaluates repair work through follow up

FACILITY

- Reviews procedures for constructing or repairing facility structures
- Ensures utility companies have pre-marked locations of buried utility lines if required

- Wears the appropriate Personal Protective Equipment (PPE)
- Prepares base if needed
- Lays stone, concrete, hardscape material as required
- Builds or adds on the structural elements required
- Cleans equipment used

## Learning Objectives

### EQUIPMENT

- Differentiate the types of equipment used in nurseries
- Identify the cutting and digging equipment used in nurseries
- Describe the tillage and soil-moving equipment used in nurseries
- Describe how diagrams schematics, equipment manuals, and equipment specifications to determine the schedule and process for PM
- Describe how diagrams schematics, equipment manuals, and equipment specifications to determine repair
- Describe the most common causes of tool/equipment failure in your facility
- Compare what equipment and equipment material are recyclable and what is not at your facility
- Evaluate methods for equipment maintenance and repair to avoid downtime
- Compare repairing on site to securing a technician from off-site
- List factors to consider in selecting a technician
- List the factors involved with preventive maintenance (time, cost) and emergency repair (downtime, cost)

### FACILITY

- Differentiate greenhouse designs
- Identify and describe greenhouse glazing materials
- Describe the functions of the headhouse
- Describe greenhouse bench options
- List common types of facility and structure projects
- List common equipment used in facility and structure projects
- Describe the process for preparing a common hardscape base
- Compare the types of materials used in paving
- Explain common steps and warnings for working with concrete
- Describe how to install a walkway
- Discuss how to properly install a fence
- Describe the different materials used to build a retaining wall
- Explain how to install a retaining wall
- Identify the major lighting techniques available for the nursery
- Explain the difference between high and low voltage
- Describe the proper installation of low-voltage lighting systems
- Identify the different materials needed to create a water feature
- Describe the proper technique for creating a small pond
- Explain how to construct a waterfall feature

## Comments:

## Unit 8: Plant Pathway Greenhouse/Floral

Competency

### 12. Sharpen hand tools

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Checks blades regularly as required
- Reviews sharpening procedure and edge bevel angle required for hand tool
- Wears appropriate PPE
- Removes surface rust and dirt
- Sands any splintered tool handles
- Replaces or tightens broken or loose tool handles
- Uses an appropriate file or stone to sharpen nicked or dull tools
- Moves file away from and diagonally across the sharp edge to maintain the factory bevel
- Consults manual for sharpening tools with serrated edges
- For bow saws, uses a triangular file to sharpen both sides of each saw's teeth to the appropriate bevel
- Hones and maintains sharp edges of all cutting tools with a sharpening stone
- Periodically wipes tools with a light oil on metal parts for corrosion protection

Learning Objectives

- Discuss the types of digging and grading hand tools and their uses
- Explain the major types of pruning and cutting hand tools and their uses
- Discuss common shop hand tools used in horticulture
- List common hand tools in landscaping that require sharpening
- Discuss how to determine the correct sharpened bevel angle for a cutting tool
- Explain how serrated edges are sharpened
- Compare sharpening tools such as file and stones
- Discuss when to use which type of sharpening tool
- Demonstrate the process for sharpening

**Comments:**

# **Appendix Q**

## **AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **PLANT PATHWAY LANDSCAPING UNIT UNIT 9**

## Unit 9: Plant Pathway Landscaping

Competency

### 1. Assist to evaluate landscaping site

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews list of client requirements, proposed landscape use, and desires
- Reviews site and land use restrictions
- Evaluates current landscaping site for topography, growing light, water sources, and air flow
- **Measures landscaping site**
- **Tests soil**
- Discusses budget requirements with worksite professional
- **Assists to create the landscape design**
- Assists worksite professional to develop landscaping estimate
- Documents recommendations and plan
- Submits proposal for client review

Learning Objectives

- Explain the impact of landscaping in the U.S. economy
- Define land capability and describe ways to improve it
- Identify factors that determine land capability
- Explain the land capability classification system
- Explain how to evaluate topography, air flow and water sources
- List common land use restrictions that impact landscapers
- Explain how to put together an estimate
- Define variable, fixed and incidental costs as they relate to landscaping budgets
- Describe how to estimate landscape maintenance costs
- Differentiate between an estimate and a bid
- Describe landscape specifications
- Describe key components of a landscaping project bid
- Describe how to calculate labor standards and other labor costs

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 2. Measure and prepare landscaping site

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- ***Prepares planting spaces***
- Evaluates site for easements, setbacks, etc, if applicable
- Ensures utility companies have pre-marked locations of buried utility lines
- Obtains plat map or site survey of property
- Measures lot perimeter and verify other measured distances on plat are correct
- Measures from front corners of structures to front and side property lines
- Measures exterior walls and angles of existing structures on site
- Measures from back corner of structures to back and side property lines
- Measures existing elements such as sidewalks, driveways, and any greenery to be kept such as trees, shrubs, etc.
- Records measurements

Learning Objectives

- List tools commonly used for measuring in landscaping
- Describe how to use the measuring tools
- Explain how to calculate square footage of sod, soil, mulch, lawn, patios, driveways, walkways, linear footage of bed edging, and plant count
- Explain how Survey and GPS technology is incorporated into measuring land
- Explain the importance of spatial mapping
- Discuss the concept and principles of spatial mapping
- Describe equipment used for spatial mapping
- List techniques used to spatially map
- Explain the application of GIS/GPS systems with map development output

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 3. Test soil

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Collects samples of soil/media and/or plant tissue
- Assists worksite professional to test or send sample for soil testing
- Interprets test results of soil/media and/or plant tissue with worksite professional
- Notes deficiencies of nitrogen, phosphorus, potassium, pH, etc.
- Determines mix of fertilizers needed based on soil report with worksite professional
- **Prepares soils/media**
- **Mixes fertilizers and additives. NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).

Learning Objectives

- Determine the environmental factors that influence and optimize plant growth
- Describe nutrient application methods and appropriate practices
- Explain a soil profile
- Explain how soils within a profile change over time
- Explain the role of organic matter, soil depth, surface slope, soil organisms, and nutrient balance in soil productivity

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 4. Assist to create design

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains plat map or site survey of property
- If a plat map is not available, hand graphs or uses computer software to map site
- Chooses an appropriate map scale
- Plots measurements taken at site on scale map
- Creates landscape design based on customer requirements and site evaluation
- Utilizes design elements of line, form, texture, and color to express visual effect
- Determines plants, beds, trees, hardscaping, materials, soil, equipment and power requirements for project
- Determines a planting plan for seasonal displays of foliages, plants, and flowers
- Documents design elements and decisions made for landscaping
- Develops landscaping plan based on design
- Assists to present design to client using PowerPoint, 3D modeling, Pictures, Color Rendering, etc.

Learning Objectives

- List and define terms associated with landscape design
- Identify design elements
- Discuss applications of art in horticulture and landscaping
- Discuss principles of design that form the basis for visual impression
- Explain how to render a design to scale
- Define the categories of landscape plants
- Distinguish between an annual and a perennial
- Explain how to use annuals and perennials in the landscape
- Describe how to design a flower garden
- List common hardscaping materials used in landscaping
- List common software applications and how they are used to develop landscaping designs

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 5. Prepare supplies and equipment

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains landscaping plan list of materials, supplies and equipment needed at site
- Locates required supplies and equipment
- Restocks carts/vehicles with necessary supplies
- Uses protective gloves and clothing as required
- Handles cleaning solutions and chemicals safely as indicated on MSDS. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Returns or disposes used supplies to storage or for disposal as required
- Verifies tools and equipment to be used are clean, in working order, and current for preventive maintenance, calibration and repair
- Obtains and loads plant materials needed according to landscaping plan
- Loads all required materials, supplies, and equipment for transport to landscaping site
- Documents stocking, use, and return/disposal of supplies, materials and equipment

Learning Objectives

- Outline compliance requirements of safety and health standards in landscaping
- Describe the layout of the common landscaping facility maintenance area
- List and describe the uses of the various cleaning and chemical solutions used in the landscaping industry
- Explain how to store and dispose of pesticides

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 6. Remove waste materials and hardscaping

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains and follows landscaping plan for removal of waste materials or plants to be removed
- Digs up and removes plants to be discarded from site
- Prunes or trims plant material to be kept around landscaping spaces to allow for appropriate lighting and air circulation
- Removes sticks, stones, and other trash
- Removes old plant debris that may harbor insects and diseases
- Levels site
- Cleans equipment used

Learning Objectives

- Explain the purpose of compost
- Describe the benefits of composting
- Describe how waste plant material is used for compost
- Describe the process for starting and maintaining compost
- Discuss the environmental implications of composting versus discarding plant material

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 7. Install construction materials and hardscaping

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains and follows landscaping plan for constructing and placing hardscaping materials
- Ensures utility companies have pre-marked locations of buried utility lines
- Reviews the procedure required for the hardscape project
- Wears the appropriate Personal Protective Equipment (PPE)
- Marks the excavation area
- Excavates the site
- Installs a PVC sleeve or pipe if there may be a future need to run a utility line across the hardscaping
- Digs clean, 90-degree edges around the excavation
- Prepares and compacts the base
- Screeds the bedding sand
- Lays the stone, concrete, hardscape material as required
- Prepares the edge restraints
- Compacts the hardscaped surface if required
- Builds or adds on the structural elements required
- Cleans equipment used

Learning Objectives

- Define hardscaping
- List common types of hardscaping projects
- List common equipment used in hardscaping projects
- Explain the importance of soil compacting in hardscaping projects
- Describe the process for preparing a common hardscape base
- Describe the process for preparing bedding sand

**WALKS & DRIVEWAYS**

- Compare and contrast preparing and installing asphalt versus concrete driveways
- Compare the types of materials used in paving
- Describe the common steps for cutting and installing pavers and edging
- Explain common steps and warnings for working with concrete
- Explain how to select patio materials
- Describe how to install a walkway or patio

**DECKS**

- Discuss proper deck installation procedures

**FENCES & WALLS**

- Explain the reasons for installing a fence or wall
- Identify the different parts of a fence
- Discuss how to properly install a fence
- Describe the different materials used to build a retaining wall
- Explain how to install a retaining wall

#### LIGHTING

- Identify the major lighting techniques available for the garden
- Explain the difference between high and low voltage
- Describe the proper installation of low-voltage lighting systems
- Identify the major lighting techniques available for the garden
- Explain the difference between high and low voltage
- Describe the proper installation of low-voltage lighting systems

#### WATER FEATURES

- Identify the different materials needed to create a water feature
- Describe the proper technique for creating a small pond
- Explain how to construct a waterfall feature

#### **Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 8. Plant landscaping materials

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains and follows landscaping plan for planting
- Ensures utility companies have pre-marked locations of buried utility lines
- Verifies or **installs watering** sources
- Tills or turns the soil
- Wears any required Personal Protective Equipment (PPE)
- **Plants seeds, seedlings, or cuttings** as indicated on landscaping plan at appropriate depths and spacing
- **Applies fertilizers** according to requirements. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Documents time, location and types of plants planted
- Cleans equipment used
- Returns or disposes unused plant material, seeds, fertilizers as required

Learning Objectives

- Outline proper planting techniques
- Describe the methods of planting annuals, perennials, and groundcovers
- Examine the developmental stages of common landscaping plants
- Describe factors affect each developmental stage
- Determine the nutrient and climatic requirements of common landscaping plants
- Analyze the three phases of perennial grass growth
- Describe the process for transplanting small trees
- Identify major parts of turfgrass plants
- Explain how turfgrasses are selected based on climate
- Identify characteristics of grass plants used for turfgrass purposes
- Analyze the influence of woody plant biology on maintenance practices
- Explain recommended watering practices for woody landscape plants
- Explain guidelines for fertilizing woody landscape plants
- Describe how to select and apply mulches to the landscape

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 9. Maintain landscaped spaces

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains and follows landscaping plan for landscaped space maintenance agreements
- Trims, tips, and weeds flower spaces
- Mows, mulches, aerates, weeds, grubs, and removes thatch from lawns
- Trims and edges around beds, walks, and walls
- Prunes and trims trees, shrubs, and hedges, using shears, or pruners
- Rakes, mulches, and composts leaves
- Waters lawns, trees, and plants, using portable sprinkler systems, hoses, or watering cans
- Uses **irrigation methods** to adjust the amount of water consumption and to prevent waste
- **Mixes and applies fertilizers and additives** onto grass, shrubs, and trees, using hand or automatic sprayers or spreaders. **NOTE:** Only certified professionals can prepare, load, apply, and handle pesticide(s).
- Shovels snow from walks, driveways, and parking lots, and spread salt in those areas
- Gathers and removes litter
- Maintains and repairs hardscaping such as fences, planters, fountains, and benches
- Monitors landscaping regularly for weeds, insects, and plant diseases
- **Operates** powered **equipment** such as mowers, tractors, snow blowers, electric clippers, and sod cutters **safely** and correctly
- Uses hand tools such as shovels, rakes, pruning saws, saws, hedge and brush trimmers, and axes safely and correctly
- Documents maintenance and monitoring as required

Learning Objectives

- Explain how building appearance and grounds maintenance affect overall experience and attitude toward a company or business
- Explain the proper use and techniques for lawn mowing, planting, weeding, pruning, and watering
- Describe equipment and any special solutions used for lawn mowing, planting, weeding, pruning, and watering
- Compare and contrast different fertilizer treatments for effectiveness, safety, and environmental impact
- Describe common plant diseases and insect infestations and what they look like
- Describe fertilization practices for turfgrass
- Explain proper mowing procedures

- Discuss water practices for turfgrass
- Describe other maintenance practices for turfgrass
- Identify turfgrass weeds and describe methods for managing weeds
- Discuss turfgrass diseases and management practices
- Identify turfgrass pests and pest management practices
- Discuss turfgrass management for golf courses
- Explain turfgrass management for athletic fields
- Describe the turfgrasses used for golf courses and athletic fields
- Explain why woody landscape plants are pruned
- Describe how to prune trees properly
- Describe various pruning techniques used with shrubs
- Explain how to rake and collect leaves to avoid back injuries
- Describe seasonal landscaping maintenance needs
- Describe how pests are controlled in landscaped areas
- Describe how to shovel snow by hand to avoid back injury
- Explain the use of salt and sand to prevent falls and slips
- Describe the effective temperature ranges of salt and sand to remove snow and ice from walkways
- Explain how chips, holes, and cracks are maintained at a facility in order to prevent slips and falls

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 10. Operate landscaping machinery safely

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Operates only equipment that he/she is trained on
- Verifies tool/equipment is available for use and in working order
- Verifies tool/equipment is current for preventative maintenance and/or calibration
- Verifies safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use
- Inspects tool/equipment and work area for safety considerations
- Sets up and prepares tool/equipment for safe operation including lubrication and fluid level checks
- Wears the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment
- Operates tool/equipment safely with guarding devices if applicable in the manner required for the job task
- Monitors tool/equipment for safe operation while operating
- Follows procedures for clean up and shut down after use
- Investigates and promptly reports abnormal tool/equipment conditions
- Shuts down and labels any tool/equipment that is not operating as expected, if applicable
- Stores tools

Learning Objectives

- List the various tools and equipment used at your worksite such as vehicles, cutting and non-cutting hand tools, sawing machines, diagnostic tools, etc.
- Outline applications of each tool and equipment
- Demonstrate the proper usage of a tool or piece of equipment
- Describe and demonstrate the safety requirements for each tool and equipment
- Discuss start up and shut down procedures for each tool/equipment you will operate
- Describe emergency shutdown procedures for the tool/equipment you will operate
- Describe the characteristics of a tool in need of maintenance
- Explain how to recognize and address malfunctions for the tool/equipment you will operate
- Describe how to recognize wear and tear on equipment components
- Describe regulations for the use of tools and equipment at your facility
- Explain Lock Out/Tag Out indications and procedures
- Compare various landscaping tools such as those used for mowing, pruning, shearing, weeding, tilling, etc.

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 11. Assist to maintain landscaping facility & equipment

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

PREVENTATIVE MAINTENANCE (PM)

- Performs routine preventative maintenance (PM) according to facility schedule
- Communicates scheduled PM to management
- Assures that alternative equipment is available if needed
- Gathers supplies to perform PM
- Ensures that equipment is properly labeled and pulled from use
- Follows appropriate Lock Out/Tag Out procedures prior to performing PM
- Follows all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
- Assists worksite professional to follow PM schedule to calibrate and maintain equipment, tools and workstations
- Assists worksite professional to re-qualify equipment for operation
- Cleans up area after PM
- Documents preventative actions taken

REPAIR

- Assures that alternative equipment is available if needed
- Consults worksite professionals, maintenance manuals, and equipment history to diagnose possible equipment problems
- Gathers supplies to perform repair
- Ensures that equipment is properly labeled and pulled from use
- Follows appropriate Lock Out/Tag Out procedures prior to performing repair
- Follows all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required
- Assists worksite professional to isolate system and component failure and to repair equipment problems
- Assists worksite professional to identify root cause of problem and develop corrective action plan
- Assists worksite professional to re-qualify equipment for operation
- Cleans up area after repair
- Documents repairs completed
- Evaluates repair work through follow up

Learning Objectives

EQUIPMENT

- Differentiate the types of tractors and transport equipment used in landscaping
- Identify the cutting and digging equipment used in landscaping projects
- Describe the tillage and soil-moving equipment used in landscaping
- Discuss the maintenance of large landscape equipment
- Describe different types of lubricants, their uses, storage, and disposal requirements
- Describe how diagrams schematics, equipment manuals, and equipment specifications to determine the schedule and process for PM
- Describe how diagrams schematics, equipment manuals, and equipment specifications to determine repair
- Describe the most common causes of tool/equipment failure in your facility
- Compare what equipment and equipment material are recyclable and what is not at your facility
- Evaluate methods for equipment maintenance and repair to avoid downtime
- Compare repairing on site to securing a technician from off-site
- List factors to consider in selecting a technician
- List the factors involved with preventive maintenance (time, cost) and emergency repair (downtime, cost)

**Comments:**

## Unit 9: Plant Pathway Landscaping

Competency

### 12. Sharpen hand tools

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Checks blades regularly as required
- Reviews sharpening procedure and edge bevel angle required for hand tool
- Wears appropriate PPE
- Removes surface rust and dirt
- Sands any splintered tool handles
- Replaces or tightens broken or loose tool handles
- Uses an appropriate file or stone to sharpen nicked or dull tools
- Moves file away from and diagonally across the sharp edge to maintain the factory bevel
- Consults manual for sharpening tools with serrated edges
- For bow saws, uses a triangular file to sharpen both sides of each saw's teeth to the appropriate bevel
- Hones and maintains sharp edges of all cutting tools with a sharpening stone
- Periodically wipes tools with a light oil on metal parts for corrosion protection

Learning Objectives

- Discuss the types of digging and grading hand tools and their uses
- Explain the major types of pruning and cutting hand tools and their uses
- Discuss common shop hand tools used in horticulture
- List common hand tools in landscaping that require sharpening
- Discuss how to determine the correct sharpened bevel angle for a cutting tool
- Explain how serrated edges are sharpened
- Compare sharpening tools such as file and stones
- Discuss when to use which type of sharpening tool
- Demonstrate the process for sharpening tools

**Comments:**

# **Appendix R**

## **AGRICULTURE, FOOD AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **ENVIRONMENTAL SYSTEMS PATHWAY BASIC WATER RESOURCES UNIT UNIT 10**

## Basic Water Resources Unit- REQUIRED FIRST

<b>Competency (Work Tasks)</b>	<b>Performance Standards</b> What employer checks for while doing task. <b>Train YA Student on.</b> YA student will ...	<b>Learning Objectives</b> What to know/learn to do this task. <b>Content Suggested</b> for Class/Reading/On-the-Job Training.
<b>1. Apply water industry knowledge</b>	<ul style="list-style-type: none"> <li>• Use water terms correctly</li> <li>• Follow all safety and security rules</li> <li>• Manage all hazards correctly (mechanical, electrical, chemical, etc.)</li> <li>• Apply basic principles of water quality management, chemistry, and physics as indicated in job functions</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the natural water cycle</li> <li>• Define common water industry terms</li> <li>• Classify water sources- surface water, groundwater, watersheds, wastewater types, etc.-</li> <li>• Evaluate characteristics of source water- normal, abnormal, compliance, watershed protection</li> <li>• Compare different industries in water resources and management</li> <li>• Describe characteristics of wastewater (residential and industrial)</li> <li>• Outline basic processes for treating drinking water, industry use (food, medical) water, and wastewater treatment</li> <li>• Describe water use, processes, and conservation historically and today</li> <li>• Define effluent</li> <li>• Explain the purpose of ponds and lagoons in water treatment</li> <li>• Identify basic electrical, mechanical, and hydraulic principles</li> <li>• Discuss basic environmental water regulations such as the Clean Water Act, Wisconsin Department of Natural Resources Administrative codes for wastewater, storm water, drinking water, Wisconsin Pollutant Discharge Elimination System (WPDES) discharge permitting</li> <li>• Describe “green” urban and infrastructure planning and how it relates to wastewater management of run-off</li> </ul>
<b>TREATMENT &amp; OPERATIONS</b>		
<b>2. Read technical drawings &amp; work orders</b>	<ul style="list-style-type: none"> <li>• Review technical drawing as needed for operational tasks</li> <li>• Identify symbols and meaning on technical drawings</li> <li>• Plan work from work orders</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the need for technical drawings, also known as blueprints, schematics, or engineering drawings in water treatment facilities or job functions</li> <li>• Identify terminology related to technical drawings</li> </ul>

	<ul style="list-style-type: none"> <li>• Identify procedures to be completed from work orders</li> <li>• Refer to Operations and Maintenance Manuals during course of job tasks</li> </ul>	<ul style="list-style-type: none"> <li>• Describe how to interpret views, projections and elements from a technical drawing</li> <li>• Discuss how to interpret work orders in your facility</li> <li>• Explain the role of Standard Operating Procedures (SOPs)</li> </ul>
<b>3. Monitor operating conditions, meters &amp; gauges</b>	<ul style="list-style-type: none"> <li>• Identify and monitor the system control instruments</li> <li>• Operate flow measuring device to monitor the flow of water</li> <li>• <b>Collect operational data</b></li> <li>• Monitor and respond to alarm systems according to protocol</li> <li>• Document conditions, readings, and any actions taken</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss common preliminary treatment processes</li> <li>• Compare pre-, primary-, secondary, tertiary, and post treatment for water quality</li> <li>• Describe the flow of water and its monitoring from point of entrance to exit in your facility</li> <li>• Compare flow measurement devices</li> <li>• Explain the use of pumps, cross connections, backflow methods, and devices/valves in water flow through a treatment facility</li> </ul>
<b>4. Collect operational data</b>	<ul style="list-style-type: none"> <li>• View and obtain operational data at prescribed intervals</li> <li>• <b>Collect and store samples</b> for testing</li> <li>• Download data from meters and data-loggers into computer system databases</li> <li>• Perform physical measurements and process control calculations</li> <li>• Report any abnormal conditions to worksite professional as required</li> </ul>	<ul style="list-style-type: none"> <li>• Identify the basic components of a treatment strategy</li> <li>• Explain the water quality requirements for both your water supply and treatment</li> <li>• Differentiate between normal and abnormal operating conditions</li> </ul>
<b>5. Use operations software (SCADA, PLC, GIS/GPS, DBs)</b>	<ul style="list-style-type: none"> <li>• Obtain and use appropriate reference materials</li> <li>• Access and use appropriate file management to search for appropriate file</li> <li>• Add, Edit, Verify and Query data</li> <li>• Use appropriate computer codes, formatting, macros, charts, spreadsheets, etc.</li> <li>• Verify data prior to entry/storage</li> <li>• Generate reports as required</li> </ul>	<ul style="list-style-type: none"> <li>• Describe instrumentation and controls used on your facility</li> <li>• Define Supervisory Control and Data Acquisition (SCADA), Programmable Logic Controller (PLC), Geographic Information/Positioning System (GIS/GPS) and their purpose in a water treatment facility</li> <li>• Compare GIS and GPS</li> <li>• Explain the need for probes, controllers, meters and alarms in water resource monitoring</li> <li>• Explain how data and files are stored and “backed up”</li> <li>• Describe the purpose of security and identification information within electronic and computer systems</li> </ul>
<b>6. Adjust basic operating conditions based on readings</b>	<ul style="list-style-type: none"> <li>• <b>Collect operational data</b></li> <li>• Adjust chemical feed rates as allowed</li> <li>• Adjust flow patterns and rates as allowed</li> <li>• <b>Collect and store samples</b> for testing as required</li> <li>• Monitor adjustments to ensure conditions corrected</li> </ul>	<ul style="list-style-type: none"> <li>• List common troubleshooting processes taken in water treatment facilities</li> <li>• Describe indications and purposes for common adjustments</li> </ul>

	<ul style="list-style-type: none"> <li>• Document conditions and actions taken</li> </ul>	
<b>7. Clean &amp; maintain facility, tanks, filter beds, etc.</b>	<ul style="list-style-type: none"> <li>• Review procedure for cleaning and basic maintenance</li> <li>• Verify safety considerations prior to task</li> <li>• Gather supplies and cleaning solutions required</li> <li>• <b>Operate tools and equipment safely</b></li> <li>• <b>Collect and store samples</b> for testing if required</li> <li>• Document cleaning and maintenance as required</li> </ul>	<ul style="list-style-type: none"> <li>• Relate housekeeping and facility maintenance to operational quality</li> <li>• Identify common by-products from water treatment</li> <li>• List common housekeeping and basic maintenance functions in water treatment</li> <li>• Explain safety considerations for cleaning</li> <li>• Explain how to properly use pressurized fire hoses safely</li> </ul>
<b>8. Treat &amp;/or dispose of solids/sludge/scale</b>	<ul style="list-style-type: none"> <li>• Review procedure for treatment and/or disposal of waste</li> <li>• Verify safety considerations prior to task</li> <li>• Gather supplies and cleaning solutions required</li> <li>• <b>Operate tools and equipment safely</b></li> <li>• <b>Collect and store samples</b> of solids/sludge/scale and effluent for testing if required</li> <li>• Report any abnormal conditions to worksite professional as required</li> <li>• Dispose of waste materials as required</li> <li>• Document treatment and/or disposal as required</li> <li>• Prepare draft manifest/disposal documents</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the purpose of treating/monitoring effluent</li> <li>• Describe how common substances are removed and treated during water treatment such as solids, bacteria, algae, fungi, viruses, minerals, pollutants, and fertilizers</li> <li>• Define sludge</li> <li>• Discuss the treatment of biosolids/sludges</li> <li>• Compare aerobic and anaerobic digesters</li> <li>• Discuss recycling methods for biosolids/sludge</li> <li>• Discuss the regulatory requirements for treatment and disposal of wastes- solids/sludge/scale, etc.</li> <li>• List common methods of sludge disposal</li> <li>• Discuss water reuse from a waste water treatment plant or other type of facility</li> </ul>
<b>LAB</b>		
<b>9. Clean &amp; maintain lab equipment</b>	<ul style="list-style-type: none"> <li>• Rinse items thoroughly, as required, with the appropriate solvent</li> <li>• Soak glassware and other items in warm aqueous solution of detergent</li> <li>• Clean items to remove all residual matter</li> <li>• Rinse and dry items in required manner</li> <li>• Document cleaning procedure if required</li> <li>• Return clean glassware and instruments to their proper storage locations</li> </ul>	<ul style="list-style-type: none"> <li>• Identify common glassware, instruments, and reusable testing supplies used in the lab</li> <li>• Describe the use of common lab glassware and instruments</li> <li>• Describe proper dish washing technique for chemical glassware</li> </ul>
<b>10. Collect &amp; store samples</b>	<ul style="list-style-type: none"> <li>• Review Standard Methods for the Examination of Water and Wastewater manuals and protocols</li> <li>• Identify equipment and safety requirements to collect samples</li> <li>• Setup sampling equipment and materials</li> <li>• Setup field testing equipment, materials, etc. (test kits)</li> <li>• Identify proper method and container for sample</li> <li>• Pre-label sample containers or label immediately</li> </ul>	<ul style="list-style-type: none"> <li>• Compare manual to automatic sampling equipment</li> <li>• Describe how to collect typical water test samples (samplers, flow meters, water quality sondes, etc.)</li> <li>• Compare types of samples</li> <li>• Describe sampling methods such as composite-timed, flow proportional, grab, ultra-clean, etc.</li> <li>• Identify safety issues with sampling in the field</li> <li>• Describe field test methods</li> <li>• Explain regulations for confined space work</li> </ul>

	<ul style="list-style-type: none"> <li>after collection</li> <li>• Collect sample according to protocol</li> <li>• Place required amount of sample in container</li> <li>• Store sample as required for test</li> <li>• <b>Preserve chain of custody</b></li> </ul>	<ul style="list-style-type: none"> <li>• Identify proper storage and preservation methods</li> <li>• Identify containers for different tests</li> </ul>
<b>11. Preserve chain of custody</b>	<ul style="list-style-type: none"> <li>• Plan for sampling and locations prior to task</li> <li>• Identify sample with information such as sample person ID, date, time, location, sample number, type of sample (grab vs. composite), type of test conducted/to be conducted, other observations</li> <li>• Label/ID each sample tested or collected</li> <li>• Complete chain of custody form(s)/records</li> <li>• Affix custody seals as required</li> <li>• Obtain proper signatures and information when relinquishing custody</li> </ul>	<ul style="list-style-type: none"> <li>• Define chain of custody</li> <li>• Explain the purpose and requirements for chain of custody of samples in water treatment testing</li> <li>• Point out common sections on chain of custody forms</li> <li>• Define what situations constitute a sample is “under custody”</li> </ul>
<b>12. Weigh &amp; measure accurately</b>	<ul style="list-style-type: none"> <li>• Review the protocol for accurately using the measuring equipment including safety precautions</li> <li>• Ensure equipment is usable and current for calibration</li> <li>• Weigh/measure mass (solids and liquids)</li> <li>• Weigh/measure volume</li> <li>• Measure temperature</li> <li>• Record measurements in appropriate units</li> <li>• Clean up equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Explain how to properly weigh and measure solids and liquids</li> <li>• List common units used in labs for mass, volume, and temperature</li> <li>• Explain how to zero and use scales</li> <li>• Identify the proper glassware to deliver and contain specific volumes</li> <li>• Demonstrate reading volume in glassware</li> <li>• Explain how to pipette and micropipette different volumes of liquid correctly</li> <li>• Convert measurements from U.S. Standard to metric and vice versa</li> </ul>
<b>13. Perform calculations &amp; conversions</b>	<ul style="list-style-type: none"> <li>• Review the appropriate chart or reference materials to make calculations or conversions</li> <li>• Identify given values</li> <li>• Identify unknown values</li> <li>• Determine the calculations or conversions and formulas that need to be performed</li> <li>• Perform calculations or conversions as required <ul style="list-style-type: none"> <li>○ Calculate volumes</li> <li>○ Calculate "pounds formula"</li> <li>○ Calculate pump rates</li> <li>○ Calculate detention times</li> <li>○ Calculate percent removal</li> <li>○ Convert flow rates</li> </ul> </li> <li>• Verify calculations or conversions with worksite professional</li> <li>• Record calculations or conversions as required</li> </ul>	<ul style="list-style-type: none"> <li>• Explain how to convert between U.S. standard measurements and metric measurements</li> <li>• Explain the link between significant figures in calculations and the measuring devices used</li> <li>• Describe the units involved in concentrations of mass, volume, molarity, molality, normality, ppm and ppb</li> <li>• Use the mole concept to convert between moles and grams</li> <li>• Explain how to calculate Percent by mass, Percent by volume, Molarity, Molality, Normality, parts per million (ppm) and parts per billion (ppb)</li> </ul>

<p><b>14. Conduct basic lab testing</b></p>	<ul style="list-style-type: none"> <li>• Review the testing protocol including safety precautions</li> <li>• Select and set-up the correct equipment and supplies</li> <li>• Prepare reagents, solutions, and/or buffers</li> <li>• Prepare any quality control samples required</li> <li>• Locate and identify the sample(s) to be tested</li> <li>• Prepare samples for testing according to protocol</li> <li>• Test the sample(s) according to protocol</li> <li>• Include Quality Control (QC) samples, if applicable</li> <li>• Operate lab equipment properly</li> <li>• Records results</li> <li>• Clean glassware and instruments</li> <li>• Segregate, Recycle or Dispose of chemical, biohazardous, or infectious waste according to facility guidelines using Standard Precautions</li> <li>• Document testing results</li> </ul>	<ul style="list-style-type: none"> <li>• Compare routine lab testing to special projects analysis</li> <li>• Describe the chemistry of common water tests</li> <li>• Describe how to conduct testing for Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), solubility, pH, colloids, H<sup>+</sup> concentration, Ammonia Nitrogen (NH<sub>3</sub>-N), Total Phosphorus (TP), and Total Residue Chlorine (TRC), etc.</li> <li>• Define limit of detection (LOD)</li> <li>• Discuss common water quality standards</li> <li>• Explain common treatment requirements based on test results and permit requirements</li> <li>• Describe the proper storage and handling of various chemicals: Inorganic, Organic, acids, chlorinated chemicals, flammable, corrosive</li> <li>• Define the common uses of reagents, solutions, and buffers in testing labs</li> <li>• Explain how to avoid contaminating reagents during preparation</li> <li>• Discuss the requirement for quality control (QC) samples and/or equipment controls in testing</li> <li>• Define positive and negative control</li> <li>• Explain the procedures for safe handling and disposal of chemical and biological Materials</li> <li>• Define the purpose of Standard Precautions</li> <li>• Explain how to handle and dispose of laboratory wastes safely</li> </ul>
---	---	--

**EQUIPMENT & QUALITY**

<p><b>15. Operate tools &amp; equipment safely</b></p>	<ul style="list-style-type: none"> <li>• Operate only equipment trained on</li> <li>• Choose correct tool or equipment for the task</li> <li>• Follow and complete any tool check list</li> <li>• Verify tool/equipment is available for use and in working order</li> <li>• Verify tool/equipment is current for preventative maintenance and/or calibration</li> <li>• Verify safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use</li> <li>• Inspect tool/equipment and work area for safety considerations</li> <li>• Set up and prepare tool/equipment for safe operation:</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the types and uses of pumps used in water treatment in your facility</li> <li>• Describe common water treatment equipment used in aeration, filtering, disinfecting, coagulation, sedimentation, screening, sludge treatment, nutrient removal, etc.</li> <li>• Explain the proper use of fire hoses, hydrants, and hose bibs</li> <li>• List the various tools and equipment used at your facility</li> <li>• Outline applications of each tool and equipment</li> <li>• Describe and demonstrate the safety requirements for each tool and equipment</li> </ul>
--	--	---

	<ul style="list-style-type: none"> <li>• Wear the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment</li> <li>• Operates tool/equipment safely with guarding devices in the manner required for the job task</li> <li>• Monitor tool/equipment for safe operation while operating</li> <li>• Compare tool/equipment performance regularly to optimal equipment operations</li> <li>• Follow facility procedures for cleanup and shut down after use</li> <li>• Investigate and promptly report abnormal tool/equipment conditions</li> <li>• Properly shut down and label any tool/equipment that is not operating as expected</li> <li>• Follow Lock Out/Tag Out procedures as applicable</li> <li>• Document use as required</li> </ul>	<ul style="list-style-type: none"> <li>• Describe emergency shutdown procedures for the tool/equipment you will operate</li> <li>• Explain how to recognize and address malfunctions for the tool/equipment you will operate</li> <li>• Describe how to recognize wear and tear on equipment components</li> <li>• List which tools and equipment require safety certification</li> <li>• Explain Lock Out/Tag Out indications and procedures in your facility</li> </ul>
<p><b>16. Monitor pumps &amp; equipment for correct operation</b></p>	<ul style="list-style-type: none"> <li>• Identify the pump and equipment quality measures tracked</li> <li>• Compare current pump and equipment performance to optimal equipment operations on a regular basis</li> <li>• Report any noted deviations from expected performance</li> <li>• Assist worksite professional to investigate abnormal equipment conditions in a timely manner</li> <li>• Continuously monitor equipment that is corrected to ensure that the corrective action solved the problem</li> <li>• Document all monitoring activities</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss pump and water treatment equipment features and performance</li> <li>• Explain basic hydraulic and pneumatic principles, and lubricant and fluid characteristics</li> <li>• Describe how trends for malfunctioning equipment might appear in facility records</li> <li>• List common tools and equipment that must be monitored and maintained</li> <li>• Define Total Productive Maintenance (TPM)</li> <li>• Identify the purpose of a control chart</li> <li>• Identify conditions that require preventive or corrective actions</li> </ul>

# **Appendix S**

## **AGRICULTURE, FOOD AND NATURAL RESOURCES (AFNR) YOUTH APPRENTICESHIP**

### **ENVIRONMENTAL SYSTEMS PATHWAY ADVANCED WATER RESOURCES UNIT UNIT 11**

## Advanced Water Resources Unit

<b>Competency (Work Tasks)</b>	<b>Performance Standards</b> What employer checks for while doing task. <b>Train YA Student on;</b> YA student will ...	<b>Learning Objectives</b> What to know/learn to do this task. <b>Content Suggested</b> for Class/Reading/On-the-Job Training:
<b>Regulatory</b>		
<b>1. Assist with reporting</b>	<ul style="list-style-type: none"> <li>• Obtain required reporting forms/reports as required by schedule</li> <li>• Obtain data and information as required for report</li> <li>• Complete forms with worksite professional</li> <li>• Obtain authorizations as indicated</li> <li>• Submit reports as required in time required</li> </ul>	<ul style="list-style-type: none"> <li>• List common reports required by federal, state, and local regulations for water treatment facilities</li> <li>• Discuss common regulatory reporting and required schedules (annual, monthly, special) for water treatment</li> <li>• Define Excursion Reports</li> <li>• Discuss how reporting is handled for permit violation and errors at your facility</li> </ul>
<b>2. Assist to evaluate security &amp; public health operations</b>	<ul style="list-style-type: none"> <li>• Review security and health regulatory requirements and applicable documents such as                             <ul style="list-style-type: none"> <li>○ Environmental Protection Agency (EPA) Water Security requirements</li> <li>○ Homeland Security requirements</li> <li>○ Safe Drinking Water Act</li> </ul> </li> <li>• Assist worksite professional to develop/prepare/review audit tool including items such as                             <ul style="list-style-type: none"> <li>○ Asset identification, countermeasures, threat identification, etc.</li> </ul> </li> <li>• Assist worksite professional to perform periodic security and public health audit activities</li> <li>• Document the results of audit</li> <li>• Follow protocols for federal and/or public notice procedures if indicated</li> <li>• Participate in the creation of an improvement plan</li> <li>• Improvement plan clearly outlines change</li> <li>• Improvement plan is supported by data</li> </ul>	<ul style="list-style-type: none"> <li>• Define and explain the purpose of risk assessment</li> <li>• Discuss who sets water policy locally, nationally and globally</li> <li>• Explain public notice procedures and when they are indicated</li> <li>• Describe cultural influences on water use and perception of water use</li> <li>• Explain the Dept. of Homeland Security's Chemical Facilities Anti-Terrorism (CFATS), Safe Drinking Water Act, Clean Water Act, Water quality standards regulation</li> <li>• Explain some major advances to protect drinking water and wastewater systems</li> <li>• Discuss the methods of practice from the Water Environment Federation</li> </ul>
<b>3. Assist with required inspections/audits</b>	<ul style="list-style-type: none"> <li>• Review safety, equipment, environmental permit information, and any other applicable documents such as                             <ul style="list-style-type: none"> <li>○ Water quality standards required by Wisconsin Department of Natural Resources (DNR) and the National Environmental Policy Act (NEPA)</li> <li>○ Wisconsin Pollutant Discharge Elimination System (WPDES) permits issued to the DNR</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Discuss common regulatory requirements according to Wisconsin Department of Natural Resources (DNR) and the National Environmental Policy Act (NEPA) for water treatment</li> <li>• Discuss considerations in overall water treatment design based on water treatment function and environmental impact</li> </ul>

	<ul style="list-style-type: none"> <li>○ Discharge monitoring reports (DMRs)</li> <li>○ Compliance Maintenance Annual Reports (CMAR)</li> <li>○ Capacity Management Operations and Maintenance (CMOM) requirements and reports</li> <li>○ Certifications for operation and lab registration</li> <li>● <b>Assist to analyze operational data for productivity/trends</b></li> <li>● Assist worksite professional to develop/prepare/review audit tool</li> <li>● Assist worksite professional to perform periodic internal quality audit activities</li> <li>● Document the results of audit</li> <li>● Follow protocols for federal and/or public notice procedures if indicated</li> <li>● Participate in the creation of an improvement plan</li> <li>● Improvement plan clearly outlines change</li> <li>● Improvement plan is supported by data</li> </ul>	<ul style="list-style-type: none"> <li>● Explain why facilities become involved with improvement processes</li> <li>● Define continuous improvement</li> <li>● Explain the purpose of quality management systems</li> <li>● Describe the impact of Total Quality Management (TQM) principles</li> <li>● Explain the purpose of a quality audit</li> <li>● Describe the procedures of a quality audit</li> <li>● Describe how audit results are reported</li> </ul>
<b>TREATMENT &amp; OPERATIONS</b>		
<p><b>4. Assist to prepare chemicals</b></p>	<ul style="list-style-type: none"> <li>● Review the appropriate protocol for safely preparing the chemical</li> <li>● <b>Perform calculations and conversions</b> if needed <ul style="list-style-type: none"> <li>○ Determine the concentration and amount required</li> <li>○ Calculate the amount of solute and solvent needed to prepare the desired amount</li> <li>○ Verify calculations with worksite professional</li> </ul> </li> <li>● Mix the proper concentration of solutions from solids and/or liquids</li> <li>● Test and adjust pH or concentration if required</li> <li>● Return solute, solvent, and/or concentrates to proper storage area</li> <li>● Label and store prepared item as required per protocol</li> <li>● Document chemical preparation as required</li> <li>● Clean up</li> </ul>	<ul style="list-style-type: none"> <li>● Discuss proper handling, storage and disposal of chemicals in your facility</li> <li>● Calculate dosage rates</li> <li>● Explain how to confirm chemical strength</li> <li>● Discuss the facility chemical hygiene plan for transport, mixing, and feed systems</li> <li>● Describe the proper storage and handling of various chemicals: Inorganic, Organic, acids, chlorinated chemicals, flammable, corrosive</li> <li>● Compare and contrast the properties of chemicals used in water resource management</li> <li>● Describe hazards associated with the chemicals used in water resource management</li> <li>● Define the pH scale</li> </ul>
<p><b>5. Assist to add chemicals</b></p>	<ul style="list-style-type: none"> <li>● <b>Assist to prepare chemicals</b></li> <li>● Review the appropriate protocol for safely adding chemicals</li> <li>● Confirm chemical required</li> <li>● Verify chemical is properly mixed and within expiration date</li> </ul>	<ul style="list-style-type: none"> <li>● Characterize basic aspects of water chemistry</li> <li>● Explain how common chemicals added adjust water chemistry</li> <li>● Discuss the importance of maintaining pH in a water treatment system</li> <li>● Explain chemical addition methods</li> </ul>

	<ul style="list-style-type: none"> <li>• Transport chemical to system site for addition to system as required</li> <li>• Add chemical to system site with worksite professional using manual or automatic feed systems</li> <li>• Document chemical addition as required</li> <li>• Transport, store, and dispose of materials as indicated</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the indications and use of a chemical spill kit and chemical shower/eyeball washer</li> </ul>
<b>6. Perform start-up &amp; shut-down of pumps &amp; equipment</b>	<ul style="list-style-type: none"> <li>• Review procedure for start-up or shut-down including safety precautions</li> <li>• Verify control settings needed</li> <li>• Check equipment fluid, air, pressure levels as required</li> <li>• Set equipment settings as required</li> <li>• Monitor start-up as required to ensure correct operation</li> <li>• Make adjustments if needed</li> <li>• Document start-up procedure if applicable</li> <li>• Shut-down equipment safely</li> <li>• Verify all equipment is shut down as required</li> <li>• Document shut-down procedure if applicable</li> <li>• Identify any process or equipment maintenance concerns</li> <li>• Take corrective action to report and correct maintenance concerns</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss water resource back up power resources</li> <li>• Discuss start up and shut down procedures for each tool/equipment you will operate</li> <li>• List the situations which require you to obtain help to resolve problems with equipment</li> <li>• Identify the major components of equipment used in your production process and their functions</li> <li>• List the quality checks performed as part of the start-up and shut-down process</li> <li>• List the situations which require you to obtain help to resolve problems with equipment</li> </ul>
<b>7. Inspect operational equipment</b>	<ul style="list-style-type: none"> <li>• <b>Read technical drawings</b></li> <li>• Review procedure for inspection including safety precautions</li> <li>• Obtain tools for inspection if required</li> <li>• Follow procedure to inspect equipment for function and damage</li> <li>• <b>Assist to troubleshoot and repair equipment problems</b></li> <li>• Take corrective actions</li> <li>• Lock Out/Tag Out equipment that is inoperable</li> <li>• Document inspection</li> </ul>	<ul style="list-style-type: none"> <li>• Identify basic construction components related to pumps, piping, and water collection and treatment systems (jointing, bedding, backfill, etc.)</li> <li>• Discuss common indicators and inspections performed to ensure operational quality of water treatment equipment</li> </ul>
<b>8. Assist to troubleshoot operations</b>	<ul style="list-style-type: none"> <li>• Regularly review quality control indicators for water treatment operations</li> <li>• <b>Assist to analyze lab results</b></li> <li>• <b>Assist to analyze operational data for productivity/trends</b></li> <li>• Take corrective actions for item out of compliance following required protocol</li> </ul>	<ul style="list-style-type: none"> <li>• Explain pathogen removal options and methods</li> <li>• Explain toxic substance removal options and methods</li> <li>• Explain elemental removal options (P, N) and methods</li> <li>• Explain chemical addition options and methods</li> </ul>

	<ul style="list-style-type: none"> <li>• Adjust processes for water treatment as required (add chemicals, adjust equipment rates, etc.)</li> <li>• Document operational correction</li> </ul>	
<b>LAB</b>		
<b>9. Prepare microscope slides</b>	<ul style="list-style-type: none"> <li>• Review protocol for preparing slides including safety precautions</li> <li>• Mount slides- <ul style="list-style-type: none"> <li>○ Place drop of sample on slide</li> <li>○ Cover sample with cover slip by placing slip at liquid edge at an angle and lower over drop</li> </ul> </li> <li>• Stain slides- <ul style="list-style-type: none"> <li>○ Stain samples according to protocol prior to slide mount or on slide as required</li> <li>○ Place one drop of stain at edge of cover slip</li> <li>○ Draw to stain other side</li> </ul> </li> <li>• <b>Operate microscope</b></li> </ul>	<ul style="list-style-type: none"> <li>• Compare microscopic, stain, and plate methods for microbe identification</li> </ul>
<b>10. Operate a microscope</b>	<ul style="list-style-type: none"> <li>• Review protocol for the microscopy required including safety precautions</li> <li>• Power on the microscope</li> <li>• Set control and magnification settings to scan first</li> <li>• Adjust light aperture, power, stage, etc. according to protocol</li> <li>• Place slide/sample on stage</li> <li>• Find item in scan setting</li> <li>• Switch to low power and use course knob to refocus</li> <li>• Switch to high power and use fine adjustment to refocus only if slide has cover slip or is thin enough</li> <li>• After slide scan/count, return all settings to lowest magnification</li> <li>• Power off microscope</li> <li>• Remove slide from stage</li> <li>• Wipe excess material as required</li> <li>• Wash and dry slides as required</li> <li>• Discard cover slips as required</li> <li>• Document testing as required</li> <li>• Cover and store microscope as required</li> </ul>	<ul style="list-style-type: none"> <li>• Compare types of microscopes and how they function to magnify samples</li> <li>• List basic components of a microscope and their functions</li> <li>• Demonstrate proper use and care of a microscope</li> </ul>
<b>11. Identify microbes</b>	<ul style="list-style-type: none"> <li>• Review protocol for quantification and/or identification of including safety precautions</li> <li>• Set up equipment and supplies needed</li> <li>• Prepare reagents, solutions, and/or buffers</li> <li>• Sample and transfer the sample in question</li> </ul> <p><b>QUANTIFICATION</b></p>	<ul style="list-style-type: none"> <li>• Discuss differences in identification techniques for the different types of microbes</li> <li>• Explain how to quantify and identify microbes</li> <li>• Compare microscopic, stain, plate, and DNA methods for microbe identification</li> <li>• List resources used for microbe identification</li> </ul>

	<ul style="list-style-type: none"> <li>• Dilute sample as required</li> <li>• Create serial dilutions if required</li> <li>• Stain and/or label sample to be counted as required by protocol for microscopy, cytometry, spectrophotometry, etc.</li> <li>• Obtain readings and/or calculate number taking into account any dilution factor</li> <li>• Document counts and calculations as required</li> </ul> <p><b>IDENTIFICATION</b></p> <ul style="list-style-type: none"> <li>• Follow protocols to perform identification tests such as the following: <ul style="list-style-type: none"> <li>○ Visually inspect colony morphology</li> <li>○ Obtain images using microscopy</li> <li>○ Stain the sample (Gram stain, Acid Fast, fluorescence, etc.)</li> <li>○ Test agglutination to a specific antibody</li> </ul> </li> <li>• Document quantification and identification procedure as required</li> <li>• Clean up and shut down equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss the implications for water treatment in the presences of common microbes</li> </ul>
<b>12. Assist to analyze lab results</b>	<ul style="list-style-type: none"> <li>• Collect data and results from testing</li> <li>• Select and use statistical tools to analyze and synthesize data</li> <li>• Create tables and graphs to organize data</li> <li>• Query and extract information from data</li> <li>• Interpret graphs and the trends in data</li> <li>• Use IT tools to manipulate data creating models, reports, plans, processes, or projects from data provided</li> <li>• Document analysis process and tools used</li> <li>• Draw conclusions based on analysis with worksite professional</li> <li>• <b>Assist to troubleshoot operations</b> and adjust processes based on lab results</li> </ul>	<ul style="list-style-type: none"> <li>• Express numbers in scientific notation</li> <li>• Manipulate numbers expressed in scientific notation back to simple numbers</li> <li>• Describe standard statistical calculations performed on sets of data (mean, median, mode, standard deviation)</li> <li>• Discuss how error is calculated</li> <li>• Discuss methods for organizing and representing data</li> </ul>
<b>EQUIPMENT &amp; QUALITY</b>		
<b>13. Maintain schedules, communication, &amp; documentation</b>	<ul style="list-style-type: none"> <li>• Identify frequency of maintenance tasks, i.e., daily, every other day, weekly, monthly, yearly, etc.</li> <li>• Update schedules as maintenance is completed</li> <li>• Schedule preventive and repair maintenance with all internal and external parties with limited disruption to operations</li> <li>• Communicate maintenance and repair needs clearly</li> <li>• Use the correct reporting formats for documentation</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss how to schedule repair and maintenance functions with respect to operations requirements</li> <li>• Explain how communication for repair and maintenance issues demonstrates a knowledge <ul style="list-style-type: none"> <li>• of customer and business needs</li> </ul> </li> <li>• List the parties that need to be involved in repair and maintenance issues</li> <li>• Describe the importance of documenting</li> </ul>

	<p>and communication</p> <ul style="list-style-type: none"> <li>• Document maintenance and repair activities accurately</li> <li>• Maintenance is documented clearly and completely</li> <li>• Maintenance communication is timely and accurate</li> <li>• Maintenance communication is documented</li> </ul>	<p>communications</p> <ul style="list-style-type: none"> <li>• Describe the process of reporting and documenting preventive and corrective actions</li> <li>• Discuss why preventive/corrective records must be retained</li> </ul>
<p><b>14. Perform preventive maintenance (PM)</b></p>	<ul style="list-style-type: none"> <li>• Complete scheduled preventive maintenance (PM) tasks in a timely manner</li> <li>• Communicate PM to production and other applicable parties</li> <li>• Assure that alternative/back up equipment is available if needed by production</li> <li>• Consult worksite professionals, technical drawings, maintenance manuals, and equipment history for PM</li> <li>• Determine type of lubrication requirements</li> <li>• Gather equipment and supplies needed to perform PM</li> <li>• Ensure that equipment is properly labeled and pulled from production use</li> <li>• Follow appropriate Lock Out/Tag Out procedures prior to performing PM</li> <li>• Follow all safety requirements and wear appropriate Personal Protective Equipment (PPE) as required</li> <li>• Document preventative actions completed</li> <li>• Evaluate PM through follow up</li> </ul>	<ul style="list-style-type: none"> <li>• Compare corrective, preventive and predictive maintenance types</li> <li>• Explain the importance of Preventive Maintenance (PM)</li> <li>• List common critical PM activities at your facility</li> </ul>
<p><b>15. Calibrate equipment</b></p>	<ul style="list-style-type: none"> <li>• Check calibration certification regularly by reviewing documentation</li> <li>• Follow schedule to calibrate tools and instruments</li> <li>• Perform safety checks</li> <li>• Clean and adjust instruments before calibrating</li> <li>• Calibrate tools and instruments accurately and correctly</li> <li>• Promptly re-calibrate tools out of calibration</li> <li>• Re-qualify tools and instruments sent out for recalibration or repairs</li> <li>• Label tools and equipment that have been calibrated</li> <li>• Document all calibration activities</li> </ul>	<ul style="list-style-type: none"> <li>• Define calibration and how it is performed for common water treatment tools such as hand held meters such as pH, Dissolved Oxygen (DO), Conductivity meters</li> <li>• Explain how calibration precision and schedules are determined</li> <li>• Explain how to determine and control potential sources of measurement error</li> <li>• Discuss how to calibrate tools and instruments in your facility</li> <li>• Compare precision vs. accuracy</li> </ul>
<p><b>16. Assist to troubleshoot &amp; repair equipment</b></p>	<ul style="list-style-type: none"> <li>• Ensure that equipment is properly labeled and pulled from production use (Lock Out/Tag Out)</li> <li>• <b>Read technical drawings</b> for the equipment and process that is under investigation</li> <li>• Locate the equipment reference materials and</li> </ul>	<ul style="list-style-type: none"> <li>• Identify basic approaches to maintenance</li> <li>• Explain how to read and review repair history records</li> <li>• Describe how diagrams, schematics, equipment manuals, and equipment specifications are used to determine repair</li> </ul>

	<p>manuals</p> <ul style="list-style-type: none"> <li>• Review previous preventive maintenance and repair history records on the equipment under investigation</li> <li>• Ensure that appropriate safety devices and personal protective equipment are in place prior to diagnosis</li> <li>• Follow all safety requirements and wears appropriate Personal Protective Equipment (PPE) as required</li> <li>• Assist worksite professional to identify the components to be checked for proper operation</li> <li>• Assist the worksite professional to take appropriate readings using meters and testing equipment</li> <li>• Assist the worksite professional in locating and determining the cause of the problems reported</li> <li>• Assist worksite professional to match suggested remedies with problems for the inoperative systems</li> <li>• Assist with basic repair</li> <li>• Assist to re-qualify equipment</li> <li>• Place equipment back into service</li> <li>• Notify operations</li> <li>• Document testing, evaluation, repair and requalification</li> <li>• Update maintenance schedules</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the most common causes of water treatment tool/equipment failure</li> <li>• Explain the meaning of common alarms on equipment</li> <li>• Describe the purpose, function, and components of common diagnostic testing equipment</li> <li>• Compare types of repair situations which would or would not require requalification</li> <li>• Distinguish between initial operational qualification of equipment and routine performance</li> <li>• qualification</li> <li>• Describe the impact of Total Quality Management (TQM) principles and ISO9000 certification on equipment qualification</li> </ul>
<p><b>17. Assist to analyze operational data for productivity/trends</b></p>	<ul style="list-style-type: none"> <li>• Obtain questionable or out of compliance data and reports</li> <li>• Define question/problem to be evaluated</li> <li>• Determine data analysis tool</li> <li>• Collect additional data if needed</li> <li>• Organize data using quality tools <ul style="list-style-type: none"> <li>○ Check Sheet</li> <li>○ Pareto Chart</li> <li>○ Scatter Diagram</li> <li>○ Histogram</li> <li>○ Cause/Effect Diagram</li> <li>○ Flowchart</li> <li>○ Control Chart</li> </ul> </li> <li>• <b>Assist to analyze lab results</b></li> <li>• Analyze other operational data collected</li> <li>• <b>Assist to troubleshoot operations</b> and adjust processes based on analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the purpose of quality tools</li> <li>• Identify the roles of management and workers regarding quality</li> <li>• Determine how quality monitoring processes are built in to operations</li> <li>• Compare common quality tools for purpose and best time to use</li> <li>• Explain the purpose of data collection and analysis to quality</li> <li>• Identify statistical tools used in process improvement such as mean, median, mode, standard deviation</li> <li>• Define and explain how to use Statistical Process Control charts</li> <li>• Discuss the importance of common lab tests such as pH, Settleability, Mixed Liquor Suspended Solids (MLSS), and Microbe Analysis in water treatment process control</li> </ul>
<p><b>18. Assist to record, summarize &amp; evaluate budget/usage/billing</b></p>	<ul style="list-style-type: none"> <li>• Assist worksite professional to process financial information such as accounts receivable and accounts payable records and usage</li> <li>• Calculate and summarize costs</li> </ul>	<ul style="list-style-type: none"> <li>• Compare investor-owned, municipal, and cooperative business models of water resources</li> <li>• Compare tangible versus intangible costs and benefits in operations</li> </ul>

<p><b>information</b></p>	<ul style="list-style-type: none"> <li>○ Estimate required resources including staff time, staff training, equipment time, equipment maintenance and repair costs, support services and staff required, facility modifications</li> <li>○ Estimate raw materials quantities needed including costs associated with energy use, handling, and processing of water</li> <li>○ Estimate time requirements with times for approvals, delays, and repairs</li> <li>● Build an estimated budget for the operations process</li> <li>● Assist worksite professional to prepare financial reports as requested</li> </ul>	<ul style="list-style-type: none"> <li>● Define accounts receivable and accounts payable</li> <li>● Compare the objectives of lean operations to cost containment and customer satisfaction</li> <li>● Describe how to calculate costs associated with staff, equipment, facilities, and materials</li> <li>● Explain how operations timetables are developed from planning for usage, materials, equipment, numbers of workers needed, and cost projections</li> <li>● Discuss how annual budgets are used to plan and budget for revenue amounts and sources, expenditures, classifications for operations, and capital improvement</li> </ul>
<p><b>19. Participate in a system project</b></p>	<ul style="list-style-type: none"> <li>● Review the scope and phases of the system project</li> <li>● Review the evaluation of the problem and the decision evidence for the system project</li> <li>● Participate in the following system project team activities as able <ul style="list-style-type: none"> <li>○ Identify the cross-functional/departmental team required for the project</li> <li>○ Take part in technical training or orientation for the system project</li> <li>○ Develop task list</li> <li>○ Evaluate project requirements such as staff, training, materials, SOPs, etc.</li> <li>○ Identify required resources and budget</li> <li>○ Estimate time requirements</li> <li>○ Develop initial project management flowchart</li> <li>○ Identify interdependencies</li> <li>○ Identify critical milestones</li> <li>○ Evaluate risks</li> <li>○ Prepare contingency plan</li> <li>○ Track critical milestones</li> <li>○ Participate in project phase review</li> <li>○ Report project status</li> <li>○ Evaluate implementation</li> </ul> </li> <li>● Periodically review system project activities completed during the course of the project and their results</li> </ul>	<ul style="list-style-type: none"> <li>● Explain the importance of team building and preparation for system projects</li> <li>● Describe how to identify stakeholders and resources needed for system projects</li> <li>● List some common long range goals, facility upgrades, and special projects for water treatment facilities</li> <li>● Define Continuous Quality Improvement (CQI)</li> <li>● Determine how business activities interface with data processing functions</li> <li>● Explain how increases in productivity are realized by CQI</li> <li>● Summarize the importance of cross-functional teams in achieving company goals</li> <li>● Describe strategies for maximizing productivity in a high tech environment</li> <li>● Classify costs (e.g., direct and indirect, fixed and variable, methods and standards)</li> <li>● Define the purpose of common quality tools used during system projects</li> </ul>

# Appendix T

---

## Agriculture, Food and Natural Resources (AFNR) Youth Apprenticeship

### Power, Structural and Technical Systems Pathway **Agriculture Mechanics Technician Unit** Unit 12

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **1. Select correct hand tools and light duty power tools required for job**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Uses correct hand tools in a safe and appropriate manner
- Identifies capabilities and limitations of hand and power tools
- Identifies worn, damaged, or abused tools
- Verifies safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use
- Demonstrates proper handling and storage of tools

#### **Learning Objectives**

- Describe the uses of agricultural mechanics hand and power tools to perform tasks
- Describe the uses of stationary tools used in the agriculture power and machinery applications
- Identify the hand tools commonly used by technicians and describe their uses including: wrenches, sockets and accessories, screwdrivers, pliers, hammers, punches and chisels, etc.
- Identify types of portable power tools used in agriculture power and machinery applications including: grinders, drills/drivers, impact wrenches, saws, and presses, etc.
- Identify the portable power tools commonly used by technicians and describe their uses
- Identify the stationary power tools commonly used by technicians and describe their uses
- Identify risks of using hand and power tools
- Describe the proper handling and storage of hand and power tools

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **2. Demonstrate safe operation of hand tools, light duty power tools and stationary tools**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Operates tools and equipment that he/she is trained on
- Operates tools and equipment with guarding devices in manner required for job task
- Inspects tool/equipment and work area for safety considerations
- Demonstrates the general safety rules for operating all power tools, regardless of type
- Follows and completes any tool checklist
- Verifies tool/equipment is available for use and in working order
- Verifies tool/equipment is current for preventative maintenance and/or calibration
- Wears the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment
- Monitors tool/equipment for safe operation during use
- Documents use and maintenance as required
- Properly shuts down and reports abnormal tool/equipment conditions or failures in operation
- Performs any required preventative maintenance procedures

#### **Learning Objectives**

- Describe and demonstrate safety precautions when using hand, power and stationary tools including band saws, drill presses, hydraulic presses, pedestal/bench grinders, abrasive cut-off saws, etc.
- Distinguish between common hand tools including: wrenches, sockets and accessories, screwdrivers, pliers, hammers, punches and chisels, etc.
- Discuss start up and shut down procedures for each tool/equipment you will operate
- Explain the purpose of preventative maintenance
- Describe emergency shutdown procedures for the tool/equipment you will operate
- Explain how to recognize and address malfunctions for the tool/equipment you will operate
- Describe how to recognize wear and tear on equipment components
- List which tools and equipment require safety certification

#### **Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **3. Clean, organize and maintain work environment**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Inspects tools and work area for safety considerations
- Complies with posted safety warnings and symbols
- Identifies unsafe conditions and/or work habits and reports them to the worksite professional immediately, if applicable
- Helps maintain a clean and safe working environment free of debris and obstacles
- Properly disposes of waste and recyclable materials
- Stores materials and tools properly
- Follows facility procedures for clean-up and shut down after use.
- Cleans light fixtures to ensure proper lighting
- Properly stores tools and equipment
- Cleans and dries floors to prevent injury
- Follows general shop housekeeping procedures

#### **Learning Objectives**

- List the major components of a facility safety program
- List the different state and federal agencies that provide regulatory oversight at your facility for personal safety, environmental safety, and equipment safety
- List accident and fire prevention techniques
- Describe how a clean work environment supports safety and efficiency
- Describe posted safety warnings and symbols and what they mean
- Describe safe and unsafe work habits and their implications
- Discuss the importance of keeping the work area and tools/equipment clean
- List mechanical, electrical, and equipment safety hazards at your facility
- Discuss how to identify and report unsafe conditions in your facility
- Discuss safety procedures to prevent accidents
- Describe the requirements at your facility for safety training and auditing
- List hazards that contribute to injury due to slips, trips, or falls
- Outline compliance requirements of sanitation and health inspections

#### **Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **4. Identify and demonstrate correct use of fasteners**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies correct fasteners for various uses in agriculture power and machinery service operations including screws, bolts, nuts, washers, keys, snap rings, pins and studs
- Selects correct tools and equipment to adjust fasteners
- Accurately measures bolt and nut length, diameter, and thread types
- Properly extracts broken bolts
- Properly restores internal and external threads

### **Learning Objectives**

- List common fasteners used in agriculture power and machinery service operations
- Discuss tools and methods for extracting broken bolts
- Explain how to restore internal and external threads
- Identify different types of threads
- Explain the basic application for screw threads
- Distinguish between single and multiple threads
- Distinguish different classification of springs

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway**

### **Agriculture Mechanics Technician**

Competency

#### **5. Handle and store oils, grease, chemicals, cleaners, solvents, etc. according to the (M)SDS**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Safely identifies, handles, stores, and uses materials according to company procedure, if applicable
- Reviews MSDS sheet to identify hazardous materials
- Performs the approved storage procedures for flammable materials found in repair facilities
- Demonstrates safe procedures for disposal of hazardous materials
- Wears and maintains personal protective equipment, including: eye, ear, hand, respiratory, body, and foot protection

#### **Learning Objectives**

- Explain the purpose of a Material Safety Data sheet Instruction on material safety data sheet (MSDS)
- Identify where MSDS sheets are normally located on the job site
- Classify what materials are considered hazardous
- Interpret what the various symbols on the sides of chemical container represent
- Explain how should flammable liquids be stored
- List what information should be on the label of a hazardous material
- Explain safe use of chemicals and equipment
- Demonstrate proper response in an emergency situation

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **6. Assist with proper engine testing and maintenance**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Consults with worksite professional to determine appropriate inspections and test(s) to perform based on customer concern
- Assists to perform repair utilizing parts manual
- Develops a preventative maintenance schedule for equipment
- Adjusts equipment for safe and efficient operation
- Determines the cost of routine equipment maintenance
- Interprets and apply service-related information, including: service bulletins, manuals, and parts catalogues

#### **Learning Objectives**

- Explain the importance of preventive maintenance on engines and equipment
- Explain the safety practices to follow when servicing equipment
- Identify common maintenance practices associated with major engine systems
- Identify controls and instruments, along with their functions
- Describe personal and environmental safety practices associated with the operation, maintenance and repair of equipment
- Explain how to perform start-up and shut-down procedures on power units and equipment as specified in technical manuals
- Outline where to locate service-related information, including: service bulletins, manuals, and parts catalogues

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **7. Demonstrate safe practices and procedures in the operation, maintenance and repair of engines and equipment**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Assists worksite professional to follow up on repaired equipment to ensure that corrective action solved the problem
- Assists worksite professional to investigate abnormal equipment conditions in a timely manner
- Diagnoses, removes, cleans, tests, repairs, and reinstalls parts of machinery and equipment using repair manual
- Follows safety precautions when operating, servicing, and maintaining machines and equipment
- Researches applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins
- Verifies operation of the instrument panel engine warning indicators
- Reviews equipment quality measures for trends and problems as required
- Compares current equipment performance to optimal equipment operations on a regular basis
- Reports any noted deviations from expected performance
- Documents all monitoring activities

#### **Learning Objectives**

- Identify basic approaches to maintenance
- Explain how to read and review repair history records
- Describe how trends for malfunctioning equipment might appear in production records
- List the tools and equipment at your facility that must be monitored and maintained
- Identify common failures relating to ignition, fuel, cooling, lubrication etc.
- Interpret service manual information for engine and equipment maintenance and repair

#### **Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **8. Assist in the pre-inspection of equipment components**

Performance Standard Condition

#### **Competence will be demonstrated**

at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Completes a visual inspection
- Consults with worksite professional to determine appropriate inspections and test(s) to perform based on customer concern
- Checks for operation and leaks of hoses, lines, valves and nozzles
- Identifies information needed and the service requested on a repair order
- Locates repair parts, using catalogs, microfiche and computers.
- Reviews vehicle service history

#### **Learning Objectives**

- Demonstrate use of the three C's: concern, cause, and correction
- Explain how to interview customers to obtain a description of the program  
Demonstrate how to interview customer to obtain description of the problem
- Explain how to use effective interpersonal relationships in dealing with customers

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **9. Assist with the setup of equipment and machinery**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Organizes work space
- Verifies equipment is available for use and in working order
- Verifies equipment is current for preventative maintenance and/or calibration
- Stages pieces and materials for assembly
- Assembles and adjusts tools and equipment as required
- Documents and keep track of service completed

#### **Learning Objectives**

- Identify the importance of an organized work space
- Demonstrate how to set up materials prior to set up
- List the types of labeling used on tools and equipment to indicate whether a tool or piece of equipment is functional and safe to use
- Explain the purpose and importance of preventative maintenance and calibration
- List the situations which require you to obtain help to resolve problems with equipment or production

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **10. Connect software to equipment and retrieve diagnostic trouble codes**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Operates different types of service software
- Verifies connection to software and equipment according to manual
- Demonstrates general computer skills
- Demonstrates the ability to toggle between screens when using software
- Interprets readings to icons
- Verifies math and make conversions when appropriate
- Performs procedures as indicated using the service software

**Learning Objectives**

- Explain the purpose of software in diagnostic trouble shooting
- Describe how to connect software to equipment
- Demonstrate how to read software codes
- Compare software programs
- Demonstrate how to complete math conversions

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **11. Check fluid levels and lubricate machinery and equipment according to manufacturer specifications**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Reviews safety and service procedures
- Determines the type of lubricant recommended based on original equipment manufacturer (OEM) requirements
- Identifies importance of oil analysis as a management tool
- Replaces any torn or missing seals
- Applies grease to each fitting and wipe away excess
- Inspects fluid levels using dipstick and change oil filters
- Verifies work and make adjustments as needed

#### **Learning Objectives**

- Identify the characteristics of liquids used in agricultural equipment
- Explain why fluid must be clean and free of contaminants
- Describe the selection and storage of liquids for agricultural equipment.
- Compare lubricants used in various machinery
- Discuss safety procedures that should be followed when working with lubricants
- Locate the areas of typical joint grease seals
- Demonstrate how to drain fluid systems
- Demonstrate how to install clean fluid and filters

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **12. Maintain vehicle and machinery appearance and cleanliness prior to inspection delivery**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Installs shields and hoods
- Verifies machinery is washed and prepped
- Inspects cleanliness of the cab
- Assures windows are clean
- Verifies that there are no external leaks from the machinery/equipment
- Follows any company procedures condition reports

#### **Learning Objectives**

- Explain the importance of vehicle/machinery appearance prior to customer delivery
- List ways to provide a positive customer experience at the time of service delivery
- Explain the purpose of a condition report
- Describe how to complete a condition report

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **13. Prepare and complete written documentation of work performed & parts used**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Identifies the purpose and importance of keeping records
- Demonstrates procedures for keeping records of equipment maintenance and services
- Documents customer concern on repair order
- Verifies work orders, service invoices, and requisitions
- Prepares a written cost estimate of repair work
- Documents parts used for service repair

#### **Learning Objectives**

- Identify and use precise language, domain-specific vocabulary to detail work completed
- Explain how to present information, finding and supporting evidence to convey a detailed record of service work
- Define customer service
- Identify importance of documentation to company bottom line and customer satisfaction
- List steps to follow when handling complaints

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **14. Look up parts**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Locates repair parts, using catalogs, microfiche, and computers
- Collects necessary information to determine part requirements
- Locates and accesses serial numbers
- Identifies section and component location on machinery/equipment
- Reviews previous repair orders
- Performs basic computer operation
- Writes up request for parts order
- Maintains agriculture mechanics business records

#### **Learning Objectives**

- Explain how to use parts manuals to locate component part information
- Compare and contrast new, used, rebuilt and remanufactured parts
- Identify sources available for replacement parts
- List requirements of replacement parts
- Describe how parts are purchased and charged to the customer.
- Define OEM and how this effects servicing
- Demonstrate how to use a computer to complete database search

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **15. Demonstrate proper use of specific diagnostic tools**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Verifies the causes of concerns with stored or active diagnostic trouble codes
- Obtains, graphs, and interprets scan tool data
- Determines necessary action
- Inspects and tests computerized engine control system sensors

#### **Learning Objectives**

- Describe common components and systems used on diagrams
- Explain the use of wiring diagrams during the diagnosis of electronic/electronic problems
- Explain the function of the diagnostic tools
- List common preventative maintenance functions and services for instrument control systems

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **16. Cut metal using an oxyacetylene torch and plasma arc torch**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Demonstrates proper safety practices while operating all welding and cutting equipment
- Interprets drawings and welding symbols
- Selects appropriate welding and cutting tips for specific applications
- Properly diagnoses equipment failure
- Sets up, adjusts, operates and shuts down oxy-fuel, welding and brazing equipment for a given job
- Lays out and prepare metals for welding
- Properly cuts metal to specifications
- Heats metal parts to assist in removal when required
- Performs start up and shut down of equipment
- Welds basic joints in all positions

### **Learning Objectives**

- Describe what supplies and equipment
- Demonstrate use of safety equipment and protective clothing for welding
- Demonstrate use of heating, cutting and gas welding equipment safely
- Read drawings and welding symbols
- Explain how to change, adjust, shut down and check for leaks in oxygen and acetylene equipment
- Demonstrate how to braze, and weld safely with oxyacetylene equipment
- Outline how to test weld quality and strength

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **17. Read and interpret hydraulic symbols and flow on a schematic drawing**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Identifies the basic hydraulic components
- Inspects operation of hydraulic circuit
- Verifies basic hydraulic component functions
- Identifies essential safety practices related to the operation of agriculture equipment using hydraulics
- Performs routine service and maintenance utilizing appropriate service manuals
- References the service manual for correct schematic of component

**Learning Objectives**

- Describe principles of hydraulic operation
- Identify major components of hydraulics
- Describe the function and relationships of the basic components of a hydraulic system
- Outline the circuit, power flow and action of each actuator
- Identify problems associated with hydraulic systems

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **18. Apply basic knowledge of hydraulics to service maintenance and repair**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Demonstrates machinery system knowledge based on current understanding
- Reviews equipment specifications (relief valve pressures, pump output, engine rpm, and operating temperature) to accurately test the system
- Complies with personal safety practices concerning clothing, tool usage, proper ventilation of fumes and securing machining
- Inspects system for temperature, pump flow, pressure tests, leakage etc.
- Uses a pressure and flow tester in diagnosing malfunctions and repairing hydraulic system
- Performs all procedures according to manufacturing requirements

### **Learning Objectives**

- Explain principles of hydraulics
- Outline the components that make up a hydraulic system including the reservoir, pump, valve(s) and actuator(s) (motor, cylinder, etc.)
- Describe safety precautions related to hydraulics systems
- Describe the physical laws of hydraulics
- Describe how hydraulic components function
- Explain how dirt and metal particles can score valves, seize pumps and clog orifices

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **19. Assist with inspection and diagnosis of hydraulic components**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Completes visual inspection to identify customer complaint based on how the system is supposed to operate
- Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- Compares test to manufacturer specifications
- Performs tests according to manual procedures
- Verify an accurate diagnosis of the problem
- Always wears appropriate personal protective equipment when checking for leaks.
- Properly uses safety equipment appropriate to working conditions
- Adjusts pressure control and relief valves
- Measures pressure within hydraulic system
- Measures flow within hydraulic system
- Diagnoses hydraulic failure
- After testing, prepares for service or cleanup work area, returns tools to proper location, and completes appropriate documentation

#### **Learning Objectives**

- Explain how to complete a visual inspection of a hydraulic system
- Demonstrate how to test a hydraulic system
- Compare the manufacturer's service library to determine specifications
- Outline how to complete a pressure test of a hydraulic system
- Describe safety considerations when working on hydraulic components

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **20. Assist with the maintenance and repair of system components**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- Retrieves shop manuals and/or electronic retrieval systems
- Changes filters and drain, flush, and refill the hydraulic system
- Repairs and replaces parts of the system according to manufacturing procedures and specifications
- Verifies service and adjust the system for proper operation
- Checks fluid levels and condition
- Changes hydraulic fluids
- Inspects system for external leaks and correct where necessary
- Cleans and flushes system based on MFG specifications and recommendations
- Maintains cleanliness during repair

#### **Learning Objectives**

- Explain the 3 C's (Concern, cause, correction)
- Describe the different types of service manuals
- Explain the different kinds of information and illustrations used in a service manual
- Describe the three basic types of troubleshooting charts found in service manuals
- Explain how to use computer-based service information
- Demonstrate process for checking fluids and replacing filters
- Explain why cleanliness is critical to proper system operation
- Demonstrate process

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **21. Interpret electrical symbols and wiring schematics**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Locates and inspect sensors and monitoring systems
- Examines electrical circuits
- Interprets drawings and symbols in service manuals
- Applies information from schematics to identify flow through circuit current
- Tests and troubleshoots electrical systems and components

**Learning Objectives**

- Describe the use of sensors and monitoring systems
- Explain the role of electrical circuits and specifications
- Explain drawings and symbols used on a drawing/service manual

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **22. Apply basic electrical theory**

Performance Standard Condition

**Competence will be demonstrated**

- a. at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- b. Identifies components in machinery that use electrical components
- c. Examines machines that use DC currents
- d. Operates tools and equipment to measure electrical output

### **Learning Objectives**

- e. Define Electrical terms
- f. Explain how to use Ohm's law to demonstrate/predict DC electrical behavior
- g. Outline how to measure the voltage and current flow in electrical circuits
- h. Demonstrate proficient use of a digital multi-meter
- i. Recognize and test electrical components and devices

Identify the symbols on an ISO electrical diagram and locate the components on equipment

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **23. Assist with repair of failed components and/or repair of wiring**

Performance Standard Condition

**Competence will be demonstrated**

- a. at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- b. Interprets a circuit diagram to trouble shoot an electrical problem
- c. Tests electrical and electronic sensing devices
- d. Locates the parts to be tested for electrical problems
- e. Uses instruments to measure Ohms, amps, and volts

### **Learning Objectives**

- f. Identify and describe the use and function of various electrical components in Agriculture
- g. Explain the principles of DC circuitry
- h. Define the scientific principles of electrical systems
- i. Describe basic alternator/generator theory
- j. Demonstrate how to test electrical circuits using sensing devices
- k. Demonstrate proper wire connector and repair
- l. Describe how to follow diagnostic and repair procedures

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **24. Assist with inspection and diagnosis of electrical/electronic components**

Performance Standard Condition

#### **Competence will be demonstrated**

- a. at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- b. Completes visual inspection to identify customer complaint based on how the system is supposed to operate
- c. Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- d. Compares test to manufacturer specifications
- e. Performs tests according to manual procedures
- f. Verifies an accurate diagnosis of the problem
- g. Always wears appropriate personal protective equipment when checking for leaks.
- h. Properly uses safety equipment appropriate to working conditions
- i. After testing, prepares for service or cleanup work area, returns tools to proper location, completes appropriate documentation

#### **Learning Objectives**

- j. Identify components in machinery use electrical components
- k. Identify which machines use DC current
- l. Describe how to complete a visual inspection
- m. Demonstrate proper use of electrical testing equipment

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **25. Assist with the maintenance and repair of electrical/electronic components**

Performance Standard Condition

**Competence will be demonstrated**

- a. at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- b. Demonstrates and repairs common failures related to electrical components
- c. Obtains equipment and materials needed
- d. Repairs switches, connectors, relays, solenoid devices for proper operation as needed
- e. Repairs the wires to ensure proper connection and wearing, rubbing or fraying
- f. Inspects devices and wires during maintenance and repairs
- g. Cleans up work area and returns tools to proper location
- h. Completes appropriate documentation

### **Learning Objectives**

- i. List various electrical components used in agriculture equipment
- j. Describe common electrical component failures
- k. Describe electrical connections within agriculture equipment
- l. Explain necessary precautions when working with electrical wires and components

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

**26. Assist with troubleshooting and installation of instrumentation and data acquisition system** (e.g., Global Positioning System (GPS), spraying, planting, and harvesting monitors )

Performance Standard Condition

### **Competence will be demonstrated**

- a. at the worksite and classroom

Performance Standard Criteria

### **Performance will be successful when the learner:**

- b. Completes visual inspection to identify customer complaint based on how the system is supposed to operate
- c. Connects equipment to diagnostic software to evaluate potential errors
- d. Consults with worksite professional to determine appropriate inspection and test(s) to perform based on customer concern
- e. Compares test to manufacturer specifications
- f. Performs tests according to manual procedures
- g. Verifies an accurate diagnosis of the problem
- h. Always wears appropriate personal protective equipment when checking for leaks.
- i. Properly uses safety equipment appropriate to working conditions
- j. After testing, prepares for service or cleans up work area, returns tools to proper location, and completes appropriate documentation

### **Learning Objectives**

- k. Explain how to read display systems
- l. Identify types of instrumentation and data systems available
- m. Explain purpose behind instrumentation and data systems in agriculture industry
- n. Describe how to connect software to troubleshoot equipment

### **Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **27. Assist to dismantle defective machines and equipment**

Performance Standard Condition

#### **Competence will be demonstrated**

- a. at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- b. Examines assembled product for visual and/or dimensional specification prior to tear down
- c. Prepares work area to lay out parts after disassembly
- d. Removes parts according to proper procedure
- e. Examines parts for defects, such as breakage or excessive wear
- f. Documents part orientation and location
- g. Maintains organization and cleans work environment

#### **Learning Objectives**

- Explain the importance of organization when dismantling equipment
- Describe how to lay out parts and document orientation during tear down
- Explain how to determine if a part is defective and needs replacement

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **28. Assist with reassembly of machines and equipment**

Performance Standard Condition

#### **Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when the learner:**

- Gathers equipment required to reassemble machinery and equipment
- Studies blueprints or manufacturers' manuals to determine correct installation or operation of machinery
- Assembles and adjusts agricultural equipment, following manufacturer's direction
- Repairs or replaces broken or malfunctioning components of machinery or equipment
- organization
- Records parts or materials used and orders or requisition new parts or materials as necessary
- Maintains organized and clean work environment
- Verifies set up meets assembly requirements and product specifications
- Operates newly repaired machinery or equipment to verify the adequacy of repairs

#### **Learning Objectives**

- Explain the importance of an organized and clean work environment
- Demonstrate how to read blueprints and manuals
- Explain how to verify set up is complete

**Comments:**

## **Unit 12: Power, Structural and Technical Systems Pathway Agriculture Mechanics Technician**

Competency

### **29. Assist with calibration, monitoring and sensing equipment**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner:**

- Demonstrates how to perform a calibration
- Performs calibrations of metering equipment
- Assists a worksite professional with set up prior to calibration
- Prepares tractors and/or equipment prior to calibration
- Verifies tractor calibrations
- Assists with diagnosing monitoring systems with onboard vehicle diagnostics
- Performs calibration and no error codes in the software once calibration is completed

**Learning Objectives**

- Describe the various type of electronically controlled systems
- Explain how to complete set up prior to calibration
- Demonstrate a proper calibration of a tractor monitoring function
- Demonstrate a proper calibration of metering sensors for equipment
- Describe how to connect and read system software

**Comments:**