# Plant & Soil Science Course No. 18058 Credit: 1.0

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

Pathways and CIP Codes:Biotechnology in Agriculture (26.1201); Comprehensive Agricultural Science (01.9999); Food Products and Processing Systems (01.0401); Plant Systems (01.1101); Biochemistry (14.1401)

Course Description: **Technical Level:** Courses expose students to the art and science of growing plants, shrubs, trees, flowers, fruits, agriculture crops and vegetables. In doing so, they cover a wide variety of topics, including greenhouse and nursery operations, soils & media mixtures, soil chemistry, fertility, mineralogy, hydrology, soil conservation, irrigation, fruit and vegetable production, turf/golf course management, interior and exterior plant scaping, irrigation systems, weed & pest control, & floral design.

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

**RATING SCALE:**

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

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

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

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

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

## Benchmark 1: History and Careers in Plant Science

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Investigate the diversity of careers in plant science. |  |
| 1.2 | Attend job or career fields. |  |
| 1.3 | Contact plant science professional organizations. |  |
| 1.4 | Job shadow a professional in the plant industry. |  |
| 1.5 | Create a timeline of the history of plant science, relating the past, present and future.  |  |

## Benchmark 2: Basic soil properties and fertility

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Define soil texture and structure. |  |
| 2.2 | Use the textural triangle to identify classification. |  |
| 2.3 | Describe water holding capacity, available water, and wilting points, permeability, leaching are effected by soil texture and nutrient availability. |  |
| 2.4 | Perform and Interpret soil test data and give objective recommendations. |  |
| 2.5 | Describe how mass flow, diffusion, and root interception affect nutrient uptake. |  |
| 2.6 | Illustrate the N-cycle and how climate, soil, and plants effect it. |  |
| 2.7 | Describe and distinguish between the different soil management practices in Ag. |  |
| 2.8 | Describe how pH affects soil health and nutrient availability. |  |
| 2.9 | Distinguish between point and nonpoint sources in the environment. |  |
| 2.10 | Illustrate the water cycle and how climate, soil, and plants effect it. |  |
| 2.11 | List and differentiate between micro and macro soil nutrients. |  |
| 2.12 | Outline the impact of soils on crop yields. |  |
| 2.13 | Identify various types of parent material types and soil forming factors. |  |
| 2.14 | Describe methods of building soil fertility. |  |
| 2.15 | Explain considerations for determining N, P, and K for soil fertility and plant growth. |  |
| 2.16 | Formulate the proper mix of dry fertilizer. |  |

## Benchmark 3: Plant Structures/Systems

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Explain the process of translocation. |  |
| 3.2 |  Identify and describe the function of plant cell. |  |
| 3.3 | Identify the parts of monocot and dicot seeds and list their functions. |  |
| 3.4 | Distinguish between GMO and PLS plants and seeds. |  |
| 3.5 | Describe methods of plant classification/nomenclature and the action of variation in natural selection. |  |
| 3.6 | Define how evapo-transpirations relates to plant growth. |  |
| 3.7 | Define photoperiodism. |  |
| 3.8 | Explain the processes of photosynthesis, respiration, and transpiration as a cyclical growth representation. |  |
| 3.9 | Illustrate the sink/source of the complete carbon cycle. |  |
| 3.10 | Illustrate the sink/source of the complete oxygen cycle. |  |
| 3.11 | Discuss the means and effects of pollination. |  |
| 3.12 | Relate the growing degree day concept to crop development. |  |
| 3.13 | Understand how temperature is important in plant development and growth (cardinal temperatures). |  |

## Benchmark 4: Weed, Disease, and Pest Control

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Identify weed, disease, and pest damage. |  |
| 4.2 | Show disease material handling techniques. |  |
| 4.3 | Identify safe procedures when handling pesticides. |  |
| 4.4 | Calculate pesticide application rates. |  |
| 4.5 | Identify the components of a pesticide label. |  |
| 4.6 | Demonstrate how to mix pesticides.  |  |
| 4.7 | Describe the general principles of IPM. |  |
| 4.8 | Distinguish between resistance and tolerance. |  |
| 4.9 | Recognize the differences in pesticide formulation from climatic conditions, using additives for drift or volatilization. |  |
| 4.10 | Identify weeds from broadleaf and grass seedlings. |  |
| 4.11 | Relate how weed life cycles differ from crop life cycles. |  |
| 4.12 | Recognize the role of natural selection in disease, weed, and pest control in a cropping practice. |  |
| 4.13 | Determine the best control measure for a given pest. |  |
| 4.14 | Relate how insect behavior is linked with a cropping practice. |  |
| 4.15 | Generate a list of beneficial insects and plants that counteract harmful weeds, diseases, and pests. |  |
| 4.16 | Describe strategies needed for disease management. |  |
| 4.17 | Explain the use of pesticides as a pest management strategy. |  |
| 4.18 | Explain how stewardship, pesticide safety, and government regulation impact common cropping decisions. |  |
| 4.19 | Understand how factors of pressure, speed, nozzle type, and spacing affect pesticide treatment success. |  |
| 4.20 | Describe the effects of herbicide: adjuvants, contact, systemic. |  |

## Benchmark 5: Fertilizer Applications

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | List characteristics of solid, gas, and liquid fertilizers. |  |
| 5.2 | Understand the effects of starter fertilizer on crop growth and yield. |  |
| 5.3 | Distinguish how fertilizer placement and time of application affect nutrient availability. |  |

## Benchmark 6: Crop Evaluation

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Properly classify common crops and weeds. |  |
| 6.2 | Describe standards used in USDA grain grading. |  |
| 6.3 | Identify principles of irrigated water vs. dry land in crop growth, seed formation, and quality. |  |

## Benchmark 7: Biotechnology Issues

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Access and review material from biotechnology firms; i.e. Monsanto, Pioneer, etc. |  |
| 7.2 | Discuss the most recent advances; i.e. Bt Corn, Round-Up Ready crops. |  |
| 7.3 | Discuss moral issues in biotechnology and gene tampering. |  |
| 7.4 | Discuss the role of biotechnology to improve plant genetics and production. |  |

## Benchmark 8: Crop Storage

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 8.1 | Describe how temperature, aeration, pests, crop condition at harvest, length of storage, and additives influence crop quality. |  |
| 8.2 | Discuss the difference between retained ownership and storage under warehouse receipt. |  |
| 8.3 | Calculate volume of bins and storage areas. |  |
| 8.4 | Calculate relative humidity, dew point, wet/dry bulb temperature, and saturation point. |  |
| 8.5 | Calculate moisture content, drying efficiency, and gas consumption for drying high moisture corn. |  |

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

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

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