

## HORTICULTURAL SCIENCE

*Horticultural Science* is a two semester course designed to give students a background in the field of horticulture and its many career opportunities. It addresses the biology and technology involved in the production, processing, and marketing of horticultural plants and products. Topics covered include: reproduction and propagation of plants, plant growth, growth media, management practices for field and greenhouse production, marketing concepts, production of plants of local interest, and pest management. Students participate in a variety of activities including extensive laboratory work usually in a school greenhouse.

### Course Specifications

- DOE Code: 5132
- Recommended Grade Level: Grade 9-12
- Recommended Prerequisites: Introduction to Agriculture, Food and Natural Resources
- Credits: 1-3 credit(s) per semester, maximum of 6 credits
- Fulfills a Life Science or Physical Science requirement for the General Diploma only or counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- Pathway Assessment: Dual credit course final exam
- This course is aligned with postsecondary courses for Dual Credit
  - IVY Tech
    - AGRI 116 – Survey of Horticulture
  - Vincennes University
    - HORT 105 – Introduction to Landscape

#### Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

#### Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

#### Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in FFA, the CTSO for this area.

## Content Standards

### Domain - Plant Classification, Anatomy, and Physiology

**Core Standard 1** Students apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.

#### Standards

- HS-1.1 Classify agricultural plants according to taxonomy systems
- HS-1.2 Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems
- HS-1.3 Apply knowledge of plant physiology and energy conversion to plant systems
- HS-1.4 Recognize nomenclature, anatomy, and plant physiology related to horticultural plants (VU-HORT 105)
- HS-1.5 Differentiate between the major groups of horticultural plants: herbaceous and woody, annual and perennial, temperate and tropical (IvT-AGRI 116)
- HS-1.6 Identify the common plant species used in horticulture (IvT-AGRI 116)
- HS-1.7 Describe the basic functions of plants parts and how plants adapt to the environment (IvT-AGRI 116)

### Domain - Environmental Factors, Nutrients and Growth Media

**Core Standard 2** Students prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients and soil on plant growth.

#### Standards

- HS-2.1 Describe factors to be considered in selecting a greenhouse heating, cooling, and ventilation system
- HS-2.2 Explain how heat, humidity, and gases affect greenhouse crops and photosynthesis
- HS-2.3 Explain the importance of light intensity and duration and the effects on plant growth
- HS-2.4 Compare and contrast an open and a closed environmental system
- HS-2.5 Describe the desired characteristics of an ideal growing medium
- HS-2.6 Evaluate different methods of watering plants and determine the appropriate method for individual plants
- HS-2.7 Explain the aspect of growth influenced by each of the essential elements
- HS-2.8 Describe the deficiency symptoms of the major plant nutrients
- HS-2.9 Explain the techniques of soil sampling and relate this process to testing the growing medium and interpreting the results to recommend fertilizer applications and pH treatment
- HS-2.10 Discuss the uses of chemicals to regulate plant growth
- HS-2.11 Analyze soils and soil fertility related to horticultural plants (VU-HORT 105)
- HS-2.12 Demonstrate knowledge of the environmental factors involved in ornamental plant production including soils, water, and pests (IvT-AGRI 116)
- HS-2.13 Characterize the types of environments involved in horticulture: greenhouse and indoor environments (IvT-AGRI 116)

### Domain - Management Practices

**Core Standard 3** Students establish management practices for field, greenhouse production.

## **Standards**

- HS-3.1 Explain the differences between field production, nursery and greenhouse production and the plants produced in each
- HS-3.2 Plan a project for growing and marketing horticultural crops
- HS-3.3 Identify parts of a greenhouse and describe interior layouts best suited for different plants
- HS-3.4 Describe the differences in the levels of marketing and the marketing options available to horticulture producers
- HS-3.5 Address the challenges of packaging and shipping of horticultural products
- HS-3.6 Explain the benefits of wholesale and retail marketing for a particular product
- HS-3.7 Describe the processes used to maintain plant quality during the marketing process
- HS-3.8 Describe the structures, equipment, and material used in the production of horticultural crops
- HS-3.9 Design a strategy for implementing fruit or vegetable production

### **Domain – Production and Maintenance Practices**

**Core Standard 4** Students establish production and maintenance practices for field and greenhouse production.

- HS-4.1 Generate a plan to water plants according to selected scheduled times and requirements
- HS-4.2 Address the maintenance and overwintering storage of horticultural crops for various climates
- HS-4.3 Explain the procedures used to harvest and handle field grown horticultural crops
- HS-4.4 Compare accepted and new practices used in growing horticultural crops
- HS-4.5 Explain hydroponics and describe the specific challenges that must be overcome for successful yields
- HS-4.6 Address the purposes of pruning and tools needed as well as specific practices for each major type of fruit and nut tree
- HS-4.7 Recognize and explain plant design, installation, and maintenance (VU-HORT 105)
- HS-4.8 Describe and be able to reproduce the production of tree fruits, small fruits, flowers, and nursery plants (VU-HORT 105)

### **Domain - Integrated Pest Management**

**Core Standard 5** Students integrate an environmentally sound pest management system for healthy plant production.

#### **Standards**

- HS-5.1 Discuss the common pests of horticultural plants and describe the damage inflicted to the plants
- HS-5.2 Explain the different categories of plant diseases for flowers, vegetables, lawns, trees and shrubs
- HS-5.3 Examine the methods used to control plant pests and identify the advantages and disadvantages of each
- HS-5.4 Identify safe use of pesticides and proper first aid procedures for pesticide poisoning
- HS-5.5 Discuss the physiological principles of herbicides and relate the action to aspects of plant growth

- HS-5.6 Explain the classification of herbicides and discuss the appropriate uses for each type
- HS-5.7 Interpret the impact of current state and federal regulations on pest control measures.
- HS-5.8 Apply and adapt knowledge of integrated pest management (VU-HORT 105)

### **Domain - Plant Propagation**

**Core Standard 6** Students apply methods of plant propagation for plant reproduction.

#### **Standards**

- HS-6.1 Explain sexual and asexual reproduction and discuss the long term benefits and problems
- HS-6.2 Demonstrate sowing techniques and provide favorable conditions for seed germination
- HS-6.3 Describe the methods used to overcome seed dormancy
- HS-6.4 Explain the methods of asexual propagation and identify which species and varieties are best suited to each method
- HS-6.5 Describe the uses of synthetic rooting hormones and explain the varying need for such supplementation
- HS-6.6 Develop a schedule for plant propagation to meet seasonal production demands
- HS-6.7 Explain modern plant propagation techniques and how they are applied to different plant groups (IvT-AGRI 116)
- HS-6.8 Describe the fundamentals of plant breeding and how it applies to ornamental plants (IvT-AGRI 116)

### **Domain - Floriculture**

**Core Standard 7** Students learn, practice, and apply skills needed in the floriculture industry.

#### **Standards**

- HS-7.1 Apply design principals to a floral arrangement
- HS-7.2 Identify and use tools and equipment specific to the floral industry
- HS-7.3 Create table deigns, body flowers, and floral displays
- HS-7.4 Practice plant care for floral products
- HS-7.5 Apply marketing strategies for floral products

### **Domain - Careers**

**Core Standard 8** Students examine the scope of career opportunities in and the importance of agriculture to the economy.

#### **Standards**

- HS-8.1 Define and explore horticultural agriculture and horticultural agribusinesses and their role in the economy
- HS-8.2 Evaluate and explore the horticultural career opportunities in agriculture
- HS-8.3 Identify how key organizational structures and processes affect organizational performance and the quality of products and services
- HS-8.4 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society

### **Domain - Leadership**

**Core Standard 9** Students validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well rounded agricultural

education.

**Standards**

- HS-9.1 Acquire and demonstrate communication skills such as writing, public speaking, and listening while refining oral, written, and verbal skills
- HS-9.2 Recognize and explain the role of the FFA in the development of leadership, education, employability, communications and human relations skills
- HS-9.3 Examine roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- HS-9.4 Acquire the skills necessary to positively influence others
- HS-9.5 Develop a skill set to enhance the positive evolution of the whole person

**Domain - Supervised Agriculture Experience**

**Core Standard 10** Students validate the necessity of a Supervised Agricultural Experience (SAE) program as a critical component to a well rounded agricultural education.

**Standards**

- HS-10.1 Explain the nature of and become familiar with those terms related to an SAE program
- HS-10.2 Explore the numerous possibilities for an SAE program which a student might develop
- HS-10.3 Develop an individual SAE program and implement record keeping skills