

HOP- Horticultural Operations Prep

Preparing for Opportunities and Employment in the ‘Original’ Green Industries (E.G., Farming, Nurseries, Landscaping and Interiorscaping)

Course Description -60hrs

This is an introductory course with the goal to familiarize and prepare individuals for work in a diversity of horticultural fields. It also introduces basic entrepreneurial concepts for those entertaining the idea of supplementing their incomes with micro businesses or even full-time independent endeavors. Students will be introduced to the variety of occupations available. Progressing through the course students will gain an appreciation and knowledge of basic plant and soil science, environments in which plants are husbanded, natural and artificial methods of production and culture, and functional uses of plants. Integrated into the curriculum are fundamental math, English and computing activities to develop proficiencies required for success.

Student Learning Outcomes

1. Become familiar with the multiplicity of horticultural and related endeavors
2. Develop basic math, English and computing skills used in various horticultural occupations.
3. Develop interpersonal skills and professionalism for interactions with coworkers and clientele.
4. Plan and manage projects and cultivate horticultural crops using legal; sustainable; safe; and ecologically-, biologically-, and technologically- sound practices.
5. Operate and maintain tools and equipment.
6. Gain an introduction to business and entrepreneurial concepts.
7. Understand the environmental and functional role of plants in different systems.

Session 1 (hrs 0-6)

Introduction

1. History, current status and trends of the various green industries.

2. Entrepreneurship and ancillary employers affiliated with the industries.
3. Plants in the environment.

Activities:

Class introductions, icebreakers personal descriptions of experience with plants and areas of interest

Class discussion of horticultural occupations, man's use of plants, environmental importance/impacts and world food security

Session 2 (hrs 6-12)

Core Horticultural Concepts

1. Basic botany and physical/physiological characteristics of plants
 - a. Plant anatomy
 - b. Photosynthesis and respiration
 - c. Water and nutrient uptake

Sources:

McMahon, Margaret, Anton M. Kofranek, and Vincent E. Rubatzky. 2001. *Hartmann's Plant Science: Growth, Development, and Utilization of Cultivated Plants* (3rd Edition). Prentice Hall.

Khan Academy: <https://www.khanacademy.org/science/biology>

2. Plant nutrient requirements
 - a. Essential plant nutrients and their role in plants
 - b. Understanding pH

Sources:

Uchida, R., & Hue, N. (2000). Soil acidity and liming. In J. Silva & R. Uchida (Eds.), *PLANT Nutrient Management In Hawaii Soils Approaches For Tropical and Subtropical Agriculture*. Retrieved from <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/pnm10.pdf>

Uchida, R. (2000). Essential nutrients for plant growth: Nutrient functions and deficiency symptoms. In J. Silva & R. Uchida (Eds.), *PLANT Nutrient Management In Hawaii Soils Approaches For Tropical and Subtropical Agriculture*. Retrieved from <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/pnm3.pdf>

3. Plant propagation

- a. Starting plants from seeds
- b. Vegetative propagation methods

Sources:

Kumar, G. N. M., Larsen, F. E., & Shekel, K. A. (2009). Propagating plants from seed. *Washington State University, Pacific Northwest Extension Publications, PNW0170*, 1-24. Retrieved from <http://cru.cahe.wsu.edu/CEPublications/pnw0170/pnw0170.pdf>

Robbins, J. (n.d.). Plant propagation for home gardeners. *University of Arkansas, Division of Agriculture, Cooperative Extension Service, FSA 6024*. Retrieved from http://www.uaex.edu/other_areas/publications/pdf/fsa-6024.pdf

Activities:

Hands-on practice germinating various vegetable seeds and selecting appropriate containers for germination

Germinating fresh papaya seeds with gelatinous covering and with covering removed

Practice vegetative propagation

4. Introduction to horticultural math- calculations commonly required on the job.

- a. Conversions among units of measure
- b. Fertilizer and amendment calculations

- c. Estimating quantities of landscaping materials
- d. Dilutions and concentrations

Activity:

Practice solving 'real world' math problems

Session 3 (hrs 12-18)

Business and Professional Skills

1. Foundational computing, record keeping, crop planning, business and marketing concepts

Activities:

Draft a resume

Develop a successive planting schedule for a crop and estimate/project yield

Session 4 (hrs 18-24)

Sustainable Production (Part 1)

1. Introduction to soil science
 - a. Textures
 - b. Porosity
 - c. Water holding capacity
 - d. Cation exchange capacity

Activity:

Determine porosity and water holding capacity of a media or soil

Source:

Plaster, Edward J. 2009. *Soil Science and Management* (5th Edition). Delmar.

2. Principles for sustaining or enhancing soil fertility, health and quality
 - a. Composts, teas, cover crops, natural amendments, and natural farming
 - b. Methods and sources of fertilizers

Activity:

Make a compost pile and actively aerated compost tea

Sources:

Schwarz, M., & Bonhotal, J. (2011). Composting at home- the green and brown alternative. Cornell University, College of Agriculture and Life Sciences, Department of Crop and Soil Sciences, Cooperative Extension service, Retrieved from <http://cwmi.css.cornell.edu/compostingathome.pdf>

Raabe, R. (n.d.). The rapid composting method. Cooperative Extension, University of California, Division of Agriculture and Natural Resources, Leaflet 21251. Retrieved from

http://vric.ucdavis.edu/pdf/compost_rapidcompost.pdf

3. Soil testing services and USDA Web Soil Survey

Activities:

Examine a soil test result and determine amounts of amendments required

Using the online web soil survey, determine characteristics of the soil at one's residence

Source:

USDA NRCS Web Soil Survey:
<http://websoilsurvey.sc.egov.usda.gov/app/HomePage.htm>

4. Soil biodiversity and organisms

Activity:

Examine organisms of a soil-, compost-, or tea sample under a microscope

Session 5 (hrs 24-30)

Sustainable Production (Part 2)

1. Integrated pest management

- a. Components of IPM
- b. Entomology
- c. Pathology
- d. Weed science

Activity:

Collect samples of plants exhibiting signs or symptoms of disease or insect damage and attempt to identify causative agent

Sources:

Norris, Robert F., Edward P Caswell-Chen, and Marcos Kogan. 2003. *Concepts in Integrated Pest Management*. Prentice Hall.

University of Minnesota Extension Publication:

http://www.extension.umn.edu/pesticides/pat/ppatman/18_3_manual/18_3_1_IPM.pdf

ATTRA National Sustainable Agriculture Information Service, *Biointensive Integrated Pest Management*: <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=146>

- 2. Agroecology and cropping systems- monoculture, polyculture, agroforestry, and permaculture
- 3. Good agricultural practices

Session 6 (hrs 30-36)

Containerized and Soilless Plant Production in Greenhouses and Nurseries

1. Natural and artificial media and growing substrates

Activity:

Mix various media components to obtain desired porosity and moisture holding capacity

Sources:

Nelson, Paul V. 2012. *Greenhouse Operation and Management* (7th Edition).
Prentice Hall

Boodley, James W. and Steven E. Newman. 2009. *The Commercial Greenhouse*
(3rd Edition). Delmar

2. Soilless culture/hydroponics

Activity:

Start a hydroponic system and measure EC of solution

3. Fertigation: constant liquid feed or pulse

Activity:

Based on a label, mix fertilizer and water to obtain a desired EC at a specific
setting of the proportioning unit

Sources:

Nelson, Paul V. 2012. *Greenhouse Operation and Management* (7th Edition).
Prentice Hall

Boodley, James W. and Steven E. Newman. 2009. *The Commercial Greenhouse*
(3rd Edition). Delmar

4. Time-release fertilizers

Activity:

Calculate weight of time-release fertilizer required for various containers and
beds.

Sources:

Nelson, Paul V. 2012. *Greenhouse Operation and Management* (7th Edition).
Prentice Hall

Boodley, James W. and Steven E. Newman. 2009. *The Commercial Greenhouse*
(3rd Edition). Delmar

Landscape Maintenance and Design (Part 1)

1. Plant identification/familiarization- common plants in the landscape

Source:

Rauch, Fred D. and Paul R. Weissich. 2000. *Plants for Tropical Landscapes a Gardeners Guide*. University of Hawaii Press.

2. Principles of pruning

Activity:

Using pruning principles (4d's etc), prune various trees and shrubs to improve health/vigor or obtain a desired form or effect.

2. Introduction to turf management

Source:

Turgeon, A.J. 2012. *Turfgrass Management* (9th Edition). Prentice Hall

4. Installation of plants in the landscape-plant spacing, planting techniques etc.

Activities:

Given an area, calculate the number of plants required at various spacing or densities

Plant groundcovers, shrubs and trees using proper planting techniques

Source:

Ingels, Jack. 2009. *Landscaping Principles and Practices* (7th Edition). Del Mar, New York

Session 8 (hrs 42-48)

Landscape Maintenance and Design (Part 2)

1. Aesthetic use of plants
2. Special considerations for interiorscapes
3. Principles of design- balance, focalization, unity, repetition, proportion, and rhythm and line

Activity:

Design a small, mixed-species plantscape using principles of design and explain rationale for the design characteristics

Source:

Ingels, Jack. 2009. *Landscaping Principles and Practices* (7th Edition). Del Mar, New York

Session 9 (hrs 48-54)

Home Food-Sufficiency and –Security

1. Intensive gardening in small spaces- beds and containers

Activity:

Plant various vegetables in appropriate sized pots, containers, or beds

2. Home hydroponics or aquaponics.

Activity:

Construct a simple noncirculating hydroponic system and check fertilizer strength of the solution

3. Ediblescaping -integrating edible plants into the landscape
4. Introduction to urban permaculture concepts

Session 10 (hrs 54-60)

Supplementing or Supplying Water to Optimize Plant Growth Through Irrigation

1. Predicting plant water requirements
2. Precipitation rates

Activities:

Calculate various precipitation rates given a specific irrigation system

Evaluate uniformity of an existing sprinkler system

2. Components of an irrigation system

Activities:

Practice simple assembly or repair techniques using common irrigation materials

Service or repair an irrigation valve

Check continuity of irrigation wires from controller to valve

Program an irrigation controller to achieve the desired schedule and precipitation rate

3. Introduction to hydraulic principles in system design

Source:

Ingels, Jack. 2009. *Landscaping Principles and Practices* (7th Edition). Del Mar, New York

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