

HORT 101: FUNDAMENTALS OF HORTICULTURE

Lecture: M/W, 1:30-2:20, SB G20

Lab: W, 2:30-4:20, SB 303 or Davies Greenhouse

Instructor: Dr. Michael Bosela, SB Rm 392. 481-6038, boselam@ipfw.edu
Office Hours: MW 9:00-9:50 a.m., M 12:00-1:00 pm, or by appointment
Webpage: <http://users.ipfw.edu/boselam> (follow the HORT 101 link)

Textbook: Preece, J.E. and Read, P.E. 2005. The Biology of Horticulture: An Introductory Textbook, Second Edition. John Wiley and Sons, New York, NY.

Introduction

Horticulture is the agriculture of fruits, vegetables, nuts, and ornamental plants. Compared with other agricultural disciplines, horticulture requires a more thorough knowledge of basic plant biology. Most of the vegetative propagation techniques used in horticulture are based on the natural cloning abilities of plants, and the contribution of hormonal and cultural manipulations to horticultural crop production is greater than is typical in agronomy or forestry, where plant growth is regulated mainly at the genetic level. In addition, since most horticultural crops are grown under artificial conditions for at least a portion of their life cycle, successful horticulture requires an basic understanding of the effects of environmental variables (light, temperature, photoperiod, etc.); which are controlled by the grower, on plant growth.

Horticulture is a diverse field with several subdisciplines (pomology, floriculture, turfgrass management, nursery management, arboriculture, etc.). The focus of this course will be on the 'science of horticulture', with an emphasis on those aspects of horticulture that are shared across most of the subdisciplines; i.e., plant nutrition, propagation, growth mechanisms, breeding and cultivar development, etc. The business, marketing, and management facets of the discipline will be discussed only to a limited degree in the class lectures. However, the career assignment and field trips will provide an introduction to the business dimensions of the profession.

Course Objectives

1. To introduce students to the scientific method as it applies in horticulture, both at the level of naming and classifying plants; and also as tool for asking and answering questions about plant biology via controlled experimentation and analysis.
2. To demonstrate basic skills and principles related to the growth and propagation of plants (grafting, stem cutting propagation, etc.)
3. To create an enthusiasm and appreciation for the diversity and complexity of plants, and an awareness of the many benefits provided by plants both aesthetically and ecologically, including their contributions to human health and nutrition.
4. To introduce students to career opportunities in horticulture.

Course Design

The lecture component of the course will be discussion-based and will emphasize active learning. For most lecture periods, students will be expected to complete a study guide based on the assigned readings prior to the start of the class period. The study guides will serve as a focal point for the discussions. Demonstration materials (living plants, slides, models, etc.) will be used to supplement the discussions.

Two of the class periods will be used for discussions of topical themes in horticulture (organic farming, genetic engineering). Reading assignments for these discussions will be placed on reserve at Helmke Library. The final class periods will be used for student presentations based on the career assignment.

The laboratory component of the course will consist of a mix of field trips and experimental labs. The experimental labs will emphasize plant identification and plant propagation skills. In contrast, the field trips will focus on more applied aspects of horticulture (landscape horticulture, nursery production, greenhouse management, etc.) and will be used to introduce students to career opportunities in horticulture. Lab worksheets will be required for each of the experimental labs. The lab also includes a formal lab report requirement.

Attendance

Regular course attendance is expected and study guides and lab assignments will not be accepted from students with unexcused absences. Medical absences must be documented with a written statement from the attending physician. For non-medical absences (family, personal), notification and approval from the instructor are required.

Grading

Aside from the exams, lab report, and the horticulture career assignment, you will be evaluated based on your participation in the class lectures and labs as assessed based on the completion of study guides or 'discussion papers', and lab worksheets, respectively. The study guides are due at the start of each lecture period and the lab worksheets are due at the start of the next lab period after data collection has been completed. Study guides will not be graded per se but must be entirely completed to earn credit (5 pts per study guide). Students must complete 18 of 22 study guides to earn all of the points (90 pts) for this portion of the course. Lab worksheet points will be assigned based on your seven highest scores (7 of 8). Grades will be assigned on a standard scale; i.e., A = 90-100%, B = 80-90%, C = 70-80%, D = 60-70%, and F = below 60%. Assignments will be accepted for up to two weeks late, but with a 5% deduction for each day.

<u>Item</u>	<u>Point Total</u>	<u>Approximate Percentage</u>
Lecture Study Guides	90 (18 x 5 points)	25%
Exams	90 (2 x 45 pts)	25%
Discussion Papers	30 (2 x 15 pts)	10%
Career Report and Presentation	35 points	10%
Lab Worksheets	70 (7 x 10 points)	20%
Lab Report	35 points	10%
Totals	350 pts	

Honors Credit

Students may take Horticulture 101 for honors credit (H-option). Eligibility for the honors option requires a cumulative GPA of 3.3 or higher at IPFW. Courses taken with a H-option are treated like regular honors courses; i.e., they count towards the credit totals needed to graduate with honors and are listed with honors designation on all official university transcripts. To earn honors credit students develop a contract to do additional projects related to the course. A typical proposal would involve independent research (library or lab-based) with faculty oversight. However, more creative options are possible, including group projects, reading journals, etc. Additional information about the honors program is available at the Honors Center (KT G35, 481-6924). NOTE: Students who are not honors-eligible based, but are interested in independent research are encouraged to talk with me about the possibility of earning Biology Special Assignments credit (Biol 195)

Student Resources

Students having difficulties in the course are encouraged to contact me directly for assistance. However, several other sources of academic support are also available on campus as outlined below:

Center for Academic Support and Advancement (CASA, KT G21; 481-6871) - Services available include free tutoring (2 hrs/week), software instruction (STEPS program), and academic skills development.

Writing Center (KT G19; 481-5740) – Mentors are available to assist with all stages of the writing process for brainstorming and outlining to editing

Dean of Students Office (Walb 111; 481-6601) – Individual and group counseling, workshops on mental health, communication and conflict resolution topics.

Center for Academic Support and Advancement (CASA, KT G21; 481-6871) - Services available include free tutoring (2 hrs/week), software instruction (STEPS program), and academic skills development.

Multicultural Services (Walb 118; 481-6605) – The office of multicultural services functions as a support system for minority, students, international students, and “at risk” students. The office is especially focused on the recruitment and retention of students.

DISABILITIES STATEMENT: If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb, room 113, telephone number 481-6658), as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD at <http://www.ipfw.edu/ssd/>

Tentative Class Schedule

Date	Topic	Textbook
M 1/8	Course Introduction	Ch. 1 (pp 3-12)
W 1/10	Plant Morphology (Organs)	Ch. 3 (pp 30-49)
M 1/15	Martin Luther King Day (No Class)	
W 1/17	Plant Histology (Cell and Tissues)	Ch. 3 (pp 24-29)
M 1/22	Plant Growth Mechanisms	Ch. 2 (pp 26, 40-41, 47-48), Handout
W 1/24	Plant Classification	Ch. 2 (pp 13-19)
M 1/29	Horticultural Breeding – Genetics	Ch. 4 (pp 64-78), Handout
W 1/31	Horticultural Breeding – Techniques	Ch. 4 (pp 79-86)
M 2/5	Horticultural Breeding – Mutations	Ch. 4 (pp 86-93)
W 2/7	DISCUSSION: Genetic Engineering	
M 2/12	Seed Propagation	Ch. 5 (pp 120-125), Ch. 6 (pp 168-169), Ch. 9 (p 265), Ch. 12 (pp 326-330)
W 2/14	Hormones and Plant Growth – Part I	Ch. 11 (pp 298-311), Ch. 12 (pp 320-323, 330-332)
M 2/19	Hormones and Plant Growth – Part II	Ch. 11 (pp 311-317)
W 2/21	Light and Plant Growth – Light & Pigments	Ch. 5 (pp 97-101, 104-114, 133-136)
M 2/26	Light and Plant Growth – Plant Response	Ch. 5 (pp 114-120, 125-130)
W 2/28	FIRST EXAM	
M 3/5	SPRING BREAK (No Class)	
W 3/7	SPRING BREAK (No Class)	
M 3/12	Temperature and Plant Growth	Ch. 6 (pp 141-172)
W 3/14	Temperature – Regulation and Plant Injuries	Ch. 6 (pp 173-186), Ch. 7 (pp 199-202)
M 3/19	Water and Plant Growth – Water Relations	Ch. 7 (pp 193-198, 202-218, 222-226), Ch. 14 (349-355)
W 3/21	Soils and Artificial Growth Media	Ch. 8 (pp 229-249)
M 3/26	Plant Nutrition – Mineral Nutrients	Ch. 9 (pp 251-265)
W 3/28	Plant Nutrition – Fertilization	Ch. 9 (pp 266-278)
M 4/2	Mulches and Plant Growth	Ch. 13 (pp 281-291)
W 4/4	Plant Tissue Culture Data Collection	
M 4/9	Plant Pests – Microbes	Ch. 16 (pp 411-430)
W 4/11	Plant Pests – Insects	Ch. 16 (pp 432-447, 453-454)
M 4/16	DISCUSSION: Organic Farming	
W 4/18	STUDENT PRESENTATIONS	
M 4/23	STUDENT PRESENTATIONS	
W 4/25	STUDENT PRESENTATIONS	
M 4/30	SECOND EXAM, 1-3 p.m.	

Tentative Lab Schedule

Date	Topic
W 1/10	LAB 1: PLANT DIVERSITY (Botanical Conservatory, \$4 admission fee)
W 1/17	LAB 2: PLANT TAXONOMY (VEGETATIVE TRAITS) – SB 303 <ul style="list-style-type: none"> • Woody plant stem and leaf characteristics • Construction of a plant identification key
W 1/24	LAB 3: PLANT IDENTIFICATION (REPRODUCTIVE TRAITS) – SB 303 <ul style="list-style-type: none"> • Flower structure and dissection • Fruit types
W 1/31	LAB 4: SEED PROPAGATION – SB 303 <ul style="list-style-type: none"> • In vitro germination of orchid seeds (Asymbiotic) • Light and hormone effects on seed germination – Lettuce, tomato • Seed stratification (cold treatment) – Redbud • Seed scarification – Honeylocust and Kentucky Coffeetree • Seedling germination patterns
W 2/7	LAB 5: VEGETATIVE PROP: DIVISION AND LAYERING - Greenhouse <ul style="list-style-type: none"> • Air layering (rubber tree, <i>Schefflera</i>) • Orchid propagation by division • Fern propagation by division
W 2/14	LAB 6: VEGETATIVE PROP: STEM AND LEAF CUTTINGS - Greenhouse <ul style="list-style-type: none"> • Leaf cutting propagation (violet, geranium, begonia, etc.) • Stem cutting propagation – auxin dose response • Collection of seed germination data
W 2/21	LAB 7: GRAFTING – Greenhouse <ul style="list-style-type: none"> • Potato-tomato grafting (cleft graft) • Apple grafting (whip and tongue) • Aspen propagation by budding
W 2/28	LAB 8: VEGETATIVE PROP: TISSUE CULTURE - Greenhouse <ul style="list-style-type: none"> • Culture initiation (Rose, aspen) • Regulation of organ regeneration <i>in vitro</i> (aspen) • Micropropagation via somatic embryos (walnut) • <i>In vitro</i> tuberization (potato)
W 3/7	SPRING BREAK
W 3/14	LAB 8: DATA COLLECTION, LAB REPORT PREPARATION – SB 303
W 3/21	LAB 9: GREENHOUSE TOUR – PRODUCTION
W 3/28	LAB 10: GREENHOUSE TOUR – PEST CONTROL
W 4/4	LAB 11: NURSERY TOUR
W 4/11	LAB 12: ORGANIC FARM (Guest Presentations)
W 4/18	LAB 13: OPEN (FOSTER PARK TOUR?)
W 4/25	LAB 14: LANDSCAPE HORTICULTURE (Allen County Extension Office)