

Hort 227
Propagation of Horticultural Plants (3 credits)
Spring 2015

Instructor: Dr. Laura G. Jull
Associate Professor and
Woody Ornamentals Extension Specialist
Rm 392 Horticulture/Plant Sciences Bldg.
Department of Horticulture
1575 Linden Drive
University of Wisconsin-Madison
Madison, WI 53706-1590

Phone and email: Office: (608) 262-1450
Fax: (608) 262-4743
Email: lgjull@wisc.edu (best way to reach me)

Office hours: Monday and Wednesday after lecture or by appointment

Teaching Assistant: Mr. Justin Schabow, email: schabow@wisc.edu Office: Rm 399 or Rm 431 Phone:
(608) 395-7988

Meeting times: Lecture: Monday and Wednesday 12:05-12:55 p.m., Rm 351 Moore Hall/Plant Sciences
Labs: Section One: Tuesday 3:30-5:25 p.m., Rm 247 Plant Sciences and greenhouse
Section Two: Wednesday 3:30-5:25 p.m., Rm 247 Plant Sciences and greenhouse

Course Description: Methods and techniques of sexual (seed) and asexual (vegetative) propagation of horticultural plants will be discussed. Labs are all hands-on involving cuttings, layering, grafting, budding, micropropagation, specialized structures and seed propagation. Labs include individual and group exercises illustrating propagation techniques and their eventual results. A class field trip to an area nursery during lab is required.

Prerequisites: Introductory Botany course (Botany 130 or Bio 151/152) or Hort 120 is a **MUST** to take this class before enrolling in my course.

Texts and References: Recommended only

1) Hartmann and Kester's Plant Propagation: Principles and Practices, 8th ed., 2011. H. T. Hartmann, D. E. Kester, F. T. Davies, Jr., and R. L. Geneve, Prentice Hall, Upper saddle River, NJ. \$191 new, but saw it for \$139.16 at Amazon.com. It is a very expensive book so that is why I only recommend it, but does have nice photos and lots of research data.

Highly Recommended

- *1) The American Horticultural Society Plant Propagation, 1999. A. Toogood, Editor, DK Publishing, New York, NY. \$22.79 new on Amazon.com. This book has great illustrations and is a nice read, though the book does not cover micropropagation.
- 2) The Reference Manual of Woody Plant Propagation: From Seed to Tissue Culture, 2nd ed. 2006. M. A. Dirr and C. W. Heuser, Jr., Timber Press, Portland, OR. \$31.61 at Amazon.com
- 3) Practical Woody Plant Propagation for Nursery Growers, 1986. B. Macdonald, Timber Press, Portland, OR. \$31 on Amazon.com.
- 4) Woody Plant Seed Manual, 2008. F. T. Bonner and R. P. Karrfalt, Editors, U.S.D.A. Forest Service Agriculture Handbook 727, U.S.D.A. Forest Service, Washington D.C. Available on-line at: http://www.nsl.fs.fed.us/nsl_wpsm.html
- 5) Growing and Propagating Showy Native Woody Plants, 1992. R. E. Bir, The University of North Carolina Press, Chapel Hill, NC. \$31.72 on Amazon.com.
- 6) Combined Proceedings of the Annual Meetings of the International Plant Propagator's Society (IPPS), papers published each year as a book or available on disc with IPPS membership at: <http://www.ipps.org/>
There are nine regions across the world with plant propagators and researchers as members.

Course Objectives: At the completion of the course, the student will be able to:

- 1) Provide the theoretical (science) and practical knowledge (hands-on skills) involved in the major types of asexual (vegetative) and sexual (seed) propagation
- 2) Recognize the importance of research and its importance in plant propagation
- 3) Acknowledge appropriate plant propagation reference materials available for developing propagation protocols
- 4) Provide expertise in plant propagation for possible future employment in commercial operations
- 5) Appreciate the great diversity and beauty of horticultural plants

Class Format:

Lectures: Consist of indoor lectures featuring PowerPoint presentations and discussion. I do not pass out my PowerPoint lecture handouts. Course information will be made available on the course's [Learn@UW](#) website each week. Students are required to attend all lectures as additional information is given only in class and not included in the PowerPoint presentations.

Labs: Start with presentation of lab instructions and short lecture followed by greenhouse propagation techniques. Most of the plants propagated in the course are available to students to take home at the end of the semester!

Grading:

| | <u>% of final grade</u> |
|-----------------------------------------------------------|-------------------------|
| <u>Lecture portion:</u> | 55% |
| Exam 1: Wed., Feb. 25 in lecture | 16% |
| Exam 2: Wed., Apr. 15 in lecture | 16% |
| Final Exam: Friday, May 15, 10:05 a.m.-12:05 p.m., Rm TBA | 18% |
| Class attendance, citizenship and participation | 5% |

***Dates for any lecture or lab exam are subject to change +/- a lecture time, dependent on material covered in class**

| | <u>% of final grade</u> |
|-----------------------------------------------|-------------------------|
| <u>Lab portion:</u> | 45% |
| Lab exam 1: Tues. or Wed., Mar. 17 or 18 | 15% |
| Lab exam final: Tues. or Wed., May 5 or 6 | 15% |
| Lab homework assignments (average) | 10% |
| Lab attendance, citizenship and participation | 5% |

Grading scale:

| | |
|-------|------|
| ≥ 92 | = A |
| 88-91 | = AB |
| 82-87 | = B |
| 78-81 | = BC |
| 70-77 | = C |
| 60-69 | = D |
| < 60 | = F |

Make-up exams: Make-up LAB exams will **NOT** be given by the instructor or teaching assistant, no exceptions! There is considerable lab preparation required for setting up the laboratory exams. For lecture exams, please contact me BEFORE the in-class exam if you cannot make the exam date. Acceptable reasons for missing the written exam date are death in the family, accident, or proof of illness. Again, **make-up lab exams are NOT given.**

Lab homework questions will be given in lab and your answers to these questions must be turned in by their due date. Assignments turned in late will **NOT** be accepted and you will receive a zero grade for that particular homework assignment. Lab questions are not given weekly, instead they are given after each propagation technique has been completed (cuttings, layering, budding, seeds, etc.). These lab questions are an excellent way to study for your lab exams.

Lab safety: To ensure safety during lab, rules and procedures must be followed at all times. These will be discussed during lab one.

Academic honesty required: Plagiarism on your homework and cheating on exams will **NOT** be tolerated at anytime. Students caught doing one of the above will receive an automatic zero for that assignment or test

and the student will be subjected to further disciplinary action at the university level. Be responsible and professional, don't cheat!

Policy on attendance: All students are expected to attend all scheduled lectures and labs for successful academic performance in this course. An excess of 3 or more unexcused absences will indicate a lack of interest, hence, your final grade will be affected since class attendance, citizenship, and participation count for 5% of your final grade in lecture AND another 5% in lab. If you miss a lab, it is your responsibility to work with your assigned group and teaching assistant to make up the work. Some experiments are on your own. If you miss them, you will have to reschedule the work with your teaching assistant.

There is no smoking or tobacco chewing allowed in the classroom, greenhouse or on field trips. **Cell phones and texting are also NOT allowed in lecture or labs. All cell phones must remain off during lectures and labs as they could be potentially used for cheating.** Laptops are allowed in lecture ONLY if you are using them to take notes. Searching the Internet or reading email is not allowed. If a phone goes off in class, you will get a warning, after that, your phone will be taken away from you until later. Cell phones can be very disruptive and are disrespectful to your classmates and instructors.

Since Wisconsin passed a concealed handgun law, handguns are NOT permitted during ANY class or lab time or on field trips. NO EXCEPTIONS!

*If you are taking this class for audit, please see me. You are expected to participate in labs and take exams.

***This class is a 3-credit course that has 4 contact hours a week. It is often said in academia that for every 1 hour you spend in the classroom, you will need to spend 3 hours in homework time, therefore, you should spend between 9 hours a week studying the material in order to do well in the course. This is YOUR responsibility! I cannot take the blame for your poor performance or grades! Each and everyone one of you CAN earn an A in my course, you just need to apply yourself on a weekly basis and enjoy learning plant propagation.

***Don't wait until the midterm if you are having problems. Please contact me as soon as possible for help. **Studying for exams will be much easier with a good attitude and weekly preparation! Get a study buddy(s) right away and meet with them weekly! Don't get behind!**

Hort 227: Plant Propagation Lab Schedule

Spring 2015

Dr. Laura Jull, Associate Professor
Rm 392 Horticulture
1575 Linden Dr.
Email: lgjull@wisc.edu
Phone: (608) 262-1450

Justin Schabow, Teaching Assistant
Rm 399 (my lab) or Rm 431 Horticulture
Email: schabow@wisc.edu
Phone: (608) 395-7988

My office hours: Mon. and Wed. after lecture
or by appointment

Johanna Oosterwyk, Greenhouse Manager
Email: jmooster@wisc.edu
Phone: (608) 262-3844

| Lab | Date | Topic |
|-----|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Jan. 20, 21 | *Introduction and lab syllabus, D.C. Smith Greenhouse tour by Johanna, lab rules and procedures; chemical and lab safety, greenhouse environment: temperature, irrigation, humidity, light, and propagation media *Seed stratification experiment, sow 0 day stratified seed in flats |
| 2 | Jan. 27, 28 | *Discuss hardwood cuttings, polarity, wounding and plant growth regulators *Propagation of hardwood woody stem cuttings *Assign homework #1: Greenhouse Environment, media |
| 3 | Feb. 3, 4 | *Discuss semi-hardwood, softwood and leafless semi-hardwood stem cuttings, physiology *Propagation of softwood (goldfish plant) and semi-hardwood "woody" (ficus) stem cuttings *Homework #1 due via email to me and my teaching assistant by Tuesday at noon |
| 4 | Feb. 10, 11 | *Discuss herbaceous stem and leaf cuttings *Propagation of herbaceous stem and leaf cuttings (many species) *Assign homework #2: Cuttings |
| 5 | Feb. 17, 18 | *Take 28 day stratified seeds out of refrigerator, sow these seeds in flats *Record germination results on lab one handout for non-stratified seeds sown week 1 *Discuss types of layering including division, perform air layering on <i>XFatshedera lizei</i> *Assign homework #3: Layering and division *Homework #2 due via email to me and my teaching assistant by Tuesday at noon |
| 6 | Feb. 24, 25 | *Discuss specialized structures used in propagation (bulbs, corms, tubers, tuberous roots, tuberous stems, rhizomes, pseudobulbs) *Propagate specialized structures *Assign homework #: Specialized structures |
| 7 | Mar. 3, 4 | *Discuss micropropagation and tissue culture *Micropropagation using potato leaf (organ) and potato shoot in vitro *Take potato micro shoots from tissue culture and place into flats with domes for ex vitro rooting *Assign homework #: Micropropagation *Homework # due via email to me and my teaching assistant by Tuesday at noon |
| 8 | Mar. 10, 11 | *Observe hardwood, softwood, semi-hardwood and some of the herbaceous stem and leaf cuttings, pass out review sheet for lab exam 1 *Discuss results of cutting experiments and go over review for lab exam 1 **Homework #5 due via email to me and my teaching assistant by Tuesday at noon |
| 9 | Mar. 17, 18 | **Take 56 (63) day stratified seeds out of refrigerator, sow these seeds in flats. Record germination results from lab one handout for 28 day stratified seeds sown week 5 ***Lab Exam 1 in headhouse |
| 10 | Mar. 24, 25 | *Discuss budding and grafting of fruit and ornamental trees and shrubs *Cleft graft English ivy onto <i>XFatshedera lizei</i> air-layered plants *Discuss grafting and budding and perform side veneer graft onto white pine rootstock with guest lecturer, Mike Yanny from Johnson's Nursery *Assign homework #: Grafting and budding *Homework #4 due via email to me and my teaching assistant by Tuesday at noon |
| ☺ | Mar. 31, Apr. 1 | NO Lab, Spring Break |
| 11 | Apr. 7, 8 | *Discuss fern propagation *Scarify honeylocust seeds and sow seeds in flats *Discuss different fruit types and seed harvesting, seed cleaning, visit Wisconsin Seed Improvement Association Lab on 5 th floor, Rm 554 Moore Hall-seed certification and testing *Assign homework #7: Fern propagation, fruit types, seed cleaning and testing *Homework #6 due via email to me and my teaching assistant by Tuesday at noon |

| | | |
|----|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12 | Apr. 14, 15 | <ul style="list-style-type: none"> *Record germination results from lab one handout for 56 day stratified seeds *Examine air layering and cleft grafts of English ivy onto <i>XFatshedera lizei</i>, sever and take cleft grafted, air-layered plant home with you *Discuss priming seeds and light and temperature effects on seed germination *Sow lettuce, tomato, and other vegetable seeds in flats *Assign homework #8: Seeds, air layering of <i>XFatshedera lizei</i> *Homework #7 due via email to me and my teaching assistant by Tuesday at noon |
| 13 | Apr. 21, 22 | <ul style="list-style-type: none"> **Required field trip to McKay Nursery in Waterloo, WI, <u>class time will go past 5:30</u> as 45 minute drive there and back with <u>approximate</u> arrival back to campus at 6:30 p.m. You will see their propagation facilities on a big scale and hopefully harvesting of plants in the field |
| 14 | Apr. 28, 29 | <ul style="list-style-type: none"> *Remove all herbaceous cuttings from flats and take home, record data *Observe grafted evergreens and record data, take home grafted evergreens *Observe and discuss micropropagation experiments *Discuss vegetable germination experiments *Pass out review sheet for final lab exam *Perform class and teaching assistant evaluations *Homework #8 due via email to me and my teaching assistant by Tuesday at noon |
| 15 | May 5, 6 | <ul style="list-style-type: none"> ***Final Lab Exam in headhouse, take home any remaining plant material from labs |

Grading

Lecture (see lecture syllabus)

% of final grade

55%

Lab portion:

45%

Lab exam 1: Tues. or Wed., Mar. 17 or 18

15%

Lab exam final: Tues. or Wed., May 5 or 6

15%

Lab homework assignments

10%

Lab attendance, citizenship and participation

5%

Attendance is recorded. Participation involves weekly group activities.

***Poor attendance, lack of good citizenship and participation in lab will affect your grade! Labs are fun so please come to lab.**

*Homework assignments are due the week after they are given by Tuesday at noon. Homework assignments must be typed (no handwritten answers accepted) into a Word document with the questions and submitted via email to the teaching assistant. **Late homework assignments are penalized 10% for each day they are late, so make sure to get them in on time.**