

# Hort 351: Plant Propagation Spring 2025

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## Instructors

Dr. GNM Kumar; [gnmkumar@wsu.edu](mailto:gnmkumar@wsu.edu) **ZOOM** Office hours W 11.30-12.30 pm (or by appointment)

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## Schedule

Lectures 10:10 am-11am; MWF (Vogel-PBS 31); Lab: Wed; 2.10 pm-5:00 pm (Vogel-PBS 35)

## Course Description:

Principles and methods of multiplying herbaceous and woody plants and their handling up to usable size. **Prerequisites:** Biol 106, Biol 107, Hort 202

## Learning Goals & Outcomes

Learning Goal	Specific Learning Objectives (SLO)	Activity	Evaluation
<b>Creative Thinking</b>	Understand the biological and scientific basis for multiplication of temperate and tropical plants with specific emphasis to United States and PNW	Lecture Class discussion Video presentation	Exams, Assignment
<b>Quantitative Reasoning</b>	Analysis of experimental data, present results in graphical and tabular format, to facilitate arriving at valid conclusions.	Lab activity Class discussion Video presentation Written reports	Lab quiz Lab report
<b>Scientific Literacy</b>	Taxonomic, morphological, anatomical, physiological, and biochemical factors associated with sexual and asexual methods of plant multiplication	Lecture Class discussion Video presentation	Exams, Assignment
<b>Information literacy</b>	Find, evaluate and assess the validity of different sources of information on propagation of plants	Video summaries Lab reports	Evaluation of reports And video summaries
<b>Communication skills</b>	class discussion	In-class participation	In-class participation
<b>Depth of learning</b>	Demonstrate understanding of scientific basis for propagation of plants	Lectures & video assignments	Exams, class discussion

*Required Text:* Hartmann HT, Kester DE, Davies FE, Geneve R (2009) **Plant Propagation: Principles and Practices** (8<sup>th</sup> Edition). Supplemental information will be provided in the lectures.

**NOTE: Having the textbook will be very helpful in your success in this course.**

## Instructor Policies

- Your success in this course depends on your attendance, participation in discussions, understanding and performance in the exams and timely submission of assignments/reports.
- Please try to arrive to class on time and be prepared to participate.

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- Emails will be sent to your email via CANVAS. Check your email.
- Log on to *CANVAS* on the WSU web site to access course announcements, content, grades, etc. Check the site frequently.
- Pay attention to submitting assignments, tests etc. to *CANVAS*. After submission, you should check to make sure it was properly submitted. **This is YOUR responsibility.**
- **You are responsible for resolving computer-related issues, if any, such as attending classes on-line, turning-in assignments, taking, and submitting exams online and on-time in a format accessible by the instructor. You are also responsible for resolving computer-related compatibility issues, if any, at your end ahead of time.**
- Tests, assignments – **no makeup unless students contact instructor prior to the event.** If there are extreme, extenuating circumstances, an alternative arrangement or to assign an incomplete grade may be considered.

### Examinations and Grading

- FOUR lecture examinations will be given during the term.
- This course has **three** lectures per week of 50 min each. There will be quite a lot of information covered that requires a significant amount of time in preparation to face the examination.
- There will be a review session before every examination. **YOU ARE REQUIRED TO COME PREPARED FOR THE REVIEW SESSION TO ASK QUESTIONS AND SEEK CLARIFICATION.**
- Questions will be drawn from lectures, reading, you-tube videos and any assigned homework.

Type of Questions	Testing attribute
<i>Fill in the blanks</i>	Answer recall
<i>Match the following</i>	Identify the correct response
<i>Multiple choice</i>	Identify the correct response
<i>True or False</i>	Reasoning ability
<i>Provide reasons</i>	Ascertain depth of understanding
<i>Short answers</i>	Use of proper language, spelling, and grammar

- **Greater emphasis will be put on assessing comprehension and understanding.** You are expected to organize ideas, thoughts, and information in order to present logical, comprehensible answers to discussion-type questions.
- Proper use of grammar, syntax, and spelling will be beneficial in evaluating your answers and assign proper grades.
- The final exam will be comprehensive, and you are required to demonstrate your ability to synthesize knowledge gained throughout the semester into logical solutions for problems involved in plant propagation.

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## Grading

Exam I (Jan 31, 2025)	10
Exam II (Feb 28, 2025)	15
Exam III (Mar 28, 2025)	15
Final Exam (Apr 29, 2025, 10.10 am -12.10 pm)	20
Video Report I	7.5
Video Report II	7.5
Lab reports	10
Lab Exam	10
Class attendance	5
<hr/> Total	<hr/> 100

**Extra Credit for class participation: 5%**

Grading will be based upon a percentage basis: Example:

**A: 95-100%; A-: 91-94%; B: 85-87%; B+: 88-90%; B-: 80-84%; C+: 78-80%; C-: 70-74%; C: 75-77%; D+ 68-70%; D-: 60-64%; D: 65-67; F: Below 60%**

## Information about the Required Policy Statements

### Reasonable Accommodation Campus Syllabus Statement.

Students with Disabilities: Reasonable accommodation is available for students with documented disabilities or chronic medical conditions. If you have a disability and need accommodations to fully participate in this class, please visit your campus Access Center website (websites listed below) to follow published procedures to request accommodations. Students may also call or email the Access Center to schedule an appointment with an Access Advisor. All disability related accommodations are to be approved through the Access Center. It is a university expectation that students with approved accommodation visit with instructors (via email or zoom) within two weeks of requesting their accommodations to discuss logistics.

### WSU Online Course Syllabus Statement

Reasonable accommodations to reduce/eliminate barriers in the learning environment are available in online classes for students with a documented disability/chronic medical condition. All accommodation must be approved through your WSU Disability Services office. If you have a disability and need accommodation, we recommend you begin the process as soon as possible. It is a university expectation that students with approved accommodation visit with instructors (via email or zoom) within two weeks of requesting their accommodations to discuss logistics.

#### ➤ **For more information contact a Disability Specialist on your home campus:**

- Pullman or WSU Online: 509-335-3417.
- <http://accesscenter.wsu.edu>, [Access.Center@wsu.edu](mailto:Access.Center@wsu.edu)
- Spokane: <https://spokane.wsu.edu/studentaffairs/access-resources/>
- Tri-Cities: <http://www.tricity.wsu.edu/disability/>
- Vancouver: 360-546-9138.  
<https://studentaffairs.vancouver.wsu.edu/studentwellness-center/access-center>

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## Academic Integrity Policy

- Washington State University, a community dedicated to the advancement of knowledge, expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The purpose of these standards and processes is to educate students and protect the welfare of the community.
- University instructors have the authority to intervene in all situations where students are suspected of academic dishonesty. In such instances, responsible instructors retain the authority to assign grades to students considering, from an academic standpoint, the nature of the student action. The consequences for such actions should be spelled out beforehand in the syllabus. More information regarding responding to academic integrity violations can be found at: <https://communitystandards.wsu.edu/>
- COVID-19 policy: Students are expected to abide by all current COVID-19 related university policies and public health directives, which could include wearing a cloth face covering, physically distancing, self-attestations, and sanitizing common use spaces. All current COVID-19 related university policies and public health directives are located at <https://wsu.edu/covid-19/>. Students who do not comply with these directives may be required to leave the classroom; in egregious or repetitive cases, students may be referred to the Center for Community Standards for university disciplinary action.

## Accommodation for Religious Observances or Activities:

Washington State University reasonably accommodates absences allowing for students to take holidays for reasons of faith or conscience or organized activities conducted under the auspices of a religious denomination, church, or religious organization. Reasonable accommodation requires the student to coordinate with the instructor on scheduling examinations or other activities necessary for course completion. Students requesting accommodation must provide written notification within the first two weeks of the beginning of the course and include specific dates for absences. Approved accommodation for absences will not adversely impact student grades. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who feel they have been treated unfairly in terms of this accommodation may refer to Academic Regulation 104 – Academic Complaint Procedures

## Distance Learning – Zoom meetings (*In case of online teaching*)

- Synchronous Classes will be held through zoom meetings every Mon, Wed and Fri. You are required to attend every class on ZOOM just like you would during a normal semester. This will help you stay engaged!
- All classes (zoom meetings) are recorded. You can access recordings on *Canvas* or *wsu.zoom.us*

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- Lecture PowerPoints can be accessed from CANVAS. THE POWEPOINTS ONLY HELP IN NAVIGATION DURING LECTURES. THEY DO NOT SERVE AS CLASS NOTES IN PREPARING FOR THE EXAMINATION. You are required to make additional notes during lectures/from text/online resources.
- DO NOT HESITATE TO LET THE INSTRUCTOR KNOW IF YOU HAVE ANY DIFFICULTUIES IN FOLLOWING THE LECTURES OR FINDING INFO ON THE TOPICS TAUGHT IN THE CLASS.
- **Zoom Etiquette:** This is a virtual classroom. Appropriate classroom behavior is expected as follows:
  - Mute your microphone when you are not speaking
  - Keep your video on during class.
  - If you have a question, raise your hand or ask the question in the chat box.
  - Remember the chat box is public and a record of the chat box is archived.
  - Please take care of your personal needs prior to entering a zoom classroom such as appropriate dress.
  - Please avoid eating, chewing gum, talking to others in your home, using cellphones etc., during the lectures

### “CANVAS” - Online Course Management system

- The online course management system can be accessed via CANVAS at: [www.canvas.wsu.edu](http://www.canvas.wsu.edu)
- Please check this site frequently for:
  - Announcements
  - Grades
  - Tests will be taken on Canvas/in person
  - Lecture power points, articles to read
  - Resources
  - Detailed assignment information
  - Recordings of class lectures

Note: In this course, a greater emphasis will be laid on **plant morphology, anatomy, physiology, and biochemistry** pertaining to plant propagation. Knowledge in these fields is important for your success in this course.

### Schedule of lectures: Tentative.

Date	Topic	Slide #
Jan 6	Course introduction and introduction to plant propagation. Distinguishing features of sexual and asexual methods of plant multiplication.	1-7
Jan 8-27	Sexual method of plant propagation. Structure & classification of seeds. Seed development: Anatomical, morphological, and hormonal	

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	factors. Factors affecting germination. Seed dormancy and methods of alleviation of dormancy. Seed production, harvesting, storage and seed treatment	8-147
Feb 03-24	Introduction to asexual methods of plant multiplication, advantages and disadvantages. Clones and cloning. Causes of variation within clones and origin of clonal cultivars. Development of chimera segments and their impact on clonal propagation. Management of source plants.	148-199
Mar 03-07	<i>Propagation of plants by cuttings:</i> Principles and techniques of plant regeneration from cuttings. Development of adventitious roots: Anatomical, physiological, biochemical and molecular considerations. Plant and environmental factors affecting regeneration of roots. Propagation techniques facilitating root development from stem, leaf and root cuttings.	200-263
Mar 17-24	<i>Propagation of plants by layering:</i> Distinguishing features of plant regeneration from cuttings and layering. Relative advantages over cuttings. Anatomical, physiological and hormonal aspects of root induction. Propagation techniques facilitating root development from layered plants.	264-275
Apr 02- 11	<i>Micropropagation of plants:</i> Principles and methods of multiplying plants <i>in vitro</i> . Tissue culture and micropropagation. Constituents of different tissue culture media and their preparation. Selection and processing of explants. Adventitious and axillary shoot culture. Role of hormones in organogenesis. Strategies for acclimation of <i>in vitro</i> plants to <i>ex-vitro</i> conditions. Tissue culture environment. Principles and techniques of embryo, ovule, cell, protoplast, haploid, meristem and aseptic seed culture and micrografting techniques.	276-352
Apr 14-18	<i>Propagation of plants by grafting and budding:</i> The meaning of grafting and budding. Advantages of grafting and budding over other vegetative methods. The need for grafting. Limitations of grafting and budding. Anatomical and physiological basis of graft union formation. Graft incompatibility causes and methods of overcoming incompatibility. Rootstock and scion relationships. Techniques of grafting/budding	353-479
Apr-21	<i>Propagation of plants by specialized structures:</i> Techniques of multiplying plants modified plant parts such as tubers, tuberous roots, bulbs, corms, offsets, runners, stolons etc. Propagation of ferns.	480-498