

HORT 503
Breeding Clonally Propagated Crops
Syllabus

Course Goal

To provide a solid foundation of the principles and procedures of breeding and variety management/maintenance of clonally-propagated crops, and to acquaint students with currently operating breeding programs focused on such crops.

Instructor

Dr. Per McCord [phmccord@wsu.edu, 509-786-9254, 166 Hamilton Hall, IAREC (Prosser)].
Office hours: by appointment

Class Time and Location

Tuesday and Thursday, 9:10-10 AM via Zoom:

<https://wsu.zoom.us/j/91222113678?pwd=dk1xbWl5OHJLV0M0M2IzNjZicjFNQT09>

2 Credits • Prerequisites: Basic knowledge of plant biology, genetics, and breeding.
Recommended coursework: CROPS/HORT 445, STAT 511.

Course Materials

- No required textbook.
- Assigned and suggested readings will be posted on Canvas.

Student Learning Outcomes

At the end of the course, students are expected to be able to:

- Understand the key differences in breeding strategies between seed and clonally-propagated crop plants
- Identify unique genetic and other biological features which can be exploited for clonal crop breeding
- Understand the challenges of breeding and variety management clonally-propagated crop plants
- Be familiar with the basic objectives and strategies of clonal crop breeding programs

Assessment

The course's **250 points** of assessment comes from:

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| 1. Mid-term exams (Two, 25 points each) | 50 pts |
| 2. Participation (discussion board posts, 2 points each) | 24 pts |
| 3. Homework assignments (Three, 12 points each) | 36 pts |
| 4. Crop presentation | 40 pts |
| 5. Final exam | 100 pts |

Mid-term exams

Two 'mid-term' exams will be given during September and November (see Course Timeline). Each exam will be given in class, and will cover the material presented up to that point (the second mid-term will be on material covered after the first exam).

Participation

Class participation will be evaluated via discussion board posts on Canvas, related to the Guest Lectures and student Crop Presentations. Discussion board posts should involve brief but thoughtful responses, and are due by the beginning of the next class period.

Homework assignments

The three homework assignments will be distributed one at a time throughout the semester. They are designed to give practice exercises in preparation for the mid-term and final exams. These assignments will be graded and returned before a particular exam, to allow students to review prior to taking the test.

Crop Presentation

Near the beginning of the semester, students will choose a clonally propagated crop of interest (must be approved by the instructor). Each student will be required to give a 20-minute presentation (including time for questions) on the characteristics, breeding objectives, and breeding methodologies related to their chosen crop.

Final exam

The final exam for the course will be given on the date/time corresponding to the WSU course schedule. It will be comprehensive, meaning that it will cover material presented throughout the semester.

Expectations for Student Effort

To complete the course satisfactorily, students are expected to complete reading assignments prior to attending class, complete assigned homework, provide thoughtful reviews of Guest Lectures and Crop Presentations, and utilize concepts learned throughout the course to prepare their own Crop Presentation. For each hour of lecture equivalent, students should expect to have a minimum of two hours of work outside class.

Attendance and Make-up Policy

Absences due to illness, personal/family emergencies, mandated court appearances, or similar reasons will be accommodated as long as such absences are not excessive, and the instructor is

notified in advance. Attendance at exams and Crop Presentations is required. These activities cannot be made up, unless a legitimate reason is provided in advance. Late homework assignments will not be accepted, unless prior arrangements have been made with the instructor (i.e. as a result of circumstances listed above).

Grading Scale

The final grade will be based on proportion of total points earned:

B+	87-89%	A	93-100%	A-	90-92%
C+	77-79%	B	83-86%	B-	80-82%
D+	67-69%	C	73-76%	C-	70-72%
F	< 60%	D	63-66%	D-	60-62%

Course Timeline

August 22- Introduction, review syllabus. Characteristics of clonally propagated crops.

August 24- Chimeras and Sports

August 29- Chimeras and Sports (continued)

August 31- Polyploidy Overview and Mendelian Genetics. Homework 1 handed out.

September 5- Polyploidy and Quantitative Genetics

September 7- Polyploidy and Quantitative Genetics (continued).

September 12— Breeding Methods I: Pedigree selection, modified backcross. Homework 1 due.

September 14— Breeding Methods II: Population improvement, biotechnology.

September 19--- Breeding Methods III: biotechnology (continued), mutation breeding, MAS.

September 21—Breeding Program: Pear Rootstocks (Dr. Soon Li Teh).

September 26- Exam 1

September 28—Genomic Selection. Homework 2 handed out.

October 3— Intellectual Property.

October 5— Variety Management (Dr. Rob Blakey, Stemilt Growers)

October 10— Propagation and Variety Maintenance. Homework 2 due.

October 12— Clean Plants (Guest Lecture)

October 17- Breeding Objectives

October 19- Field Experimental Design. Homework 3 handed out.

October 24- Field Experimental Design (continued)

October 26- Breeding Program (Guest Lecture)

October 31- Breeding Woody Ornamentals (Dr. Ryan Contreras, Oregon State University).
Homework 3 due.

November 2— Exam 2

November 7—Breeding Sweet Cherries

November 9— Breeding Hops (Dr. Kayla Altendorf, USDA-ARS)

November 14—Breeding Potatoes (Dr. Max Feldman, USDA-ARS)

November 16— Breeding Sugarcane

November 21 & 23- **No class** (Thanksgiving vacation)

November 28- Breeding Avocado and Mango (Dr. Moises Gonzalez, Sun-World International)

November 30- Crop presentations (student)

December 5—Crop presentations (student)

December 7— Crop presentations (student)

December 13—Final examination

Additional Policy Notes

Academic Integrity

All students are expected to act in accordance with the WSU policies on academic honesty as found in the *Standards of Conduct for Students* and the *Student Standards and Accountability Guidebook* which can both be found on the Office of Student Standards and Accountability website. These policies prohibit falsification and fabrication of information, plagiarism, multiple submissions, and others. For additional information see WSU's Academic Integrity Program, and for information specifically on plagiarism, see WSU Libraries Plagiarism Information Site. Plagiarism is knowingly representing the work of another as one's own, without proper acknowledgment of the source. The only exceptions to the requirement that sources be acknowledged occur when the information, ideas, etc., are common knowledge. Plagiarism includes, but is not limited to:

- submitting as one's own work the work of a "ghost writer" or work obtained from a commercial writing service, or generative AI programs such as chatGPT;
- quoting directly or paraphrasing closely from a source without giving proper credit;
- using figures, graphs, charts, or other such material without identifying the sources;
- quoting or paraphrasing extensively from a source even if credit is given.

A written document that you prepare and submit must reflect your own understanding and synthesis of the concepts. If evidence of plagiarism is detected in any assignment, that assignment will receive a zero grade and the incident could be reported to the Office of Student Standards and Accountability for further action.

Religious Accommodation

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 accommodations 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.

Safety and Emergencies

Washington State University is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu> (Pullman). It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/> to become familiar with the information provided.

University Syllabus

Students are responsible for reading and understanding all university-wide policies and resources pertaining to all courses (for instance: accommodations, care resources, policies on discrimination or harassment), which can be found in the [university syllabus](#).