

# Plant Breeding

## Instructor Information

Chris Cramer

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Personal Zoom Meeting Room – <https://nmsu.zoom.us/j/4434419420>

Office hours – 3:00-4:00PM on Tuesdays and Thursdays, & by appt

## Course Information

AGRO/HORT 462 – Plant Breeding

Fall 2020

Log into Canvas at <http://learn.nmsu.edu> using your NMSU username and password

Zoom Class Meeting Information: <https://nmsu.zoom.us/j/94556467473>

## Course Description

This course explores the principles and practices involved with the genetic improvement of plants.

## Course Delivery Method

You will be expected to read certain material and conduct work outside of class before coming to class. This work will require a time commitment on your part. I highly recommend that you devote sufficient time outside of class to this course in order to stay current in the course. For the regularly scheduled class time, we will meet on Zoom and discuss course material for that week. You will be expected to be present and to participate in the discussion.

## Course Objective

Students will learn the principles and practices involved plant genetic improvement and be able to apply them in real life scenarios.

## Textbooks and Materials

There is no required textbook for this course. I will provide course materials for you to view or read.

## Communication

I prefer to communicate with you via Zoom. In the event that I am not able to communicate with you via Zoom, I will either email you or send an announcement within Canvas. I would prefer that you communicate with me via Zoom. If you are unable to do that, please email me or call me. If I do not answer your phone call, please leave a message.

## Announcements

If I am unable to communicate with you via Zoom, I will use Announcements to send time sensitive information to the entire class. Because you can set your own notification preferences in Canvas, you will need to make sure you receive announcements daily. You are required to set your notifications for New Announcements to be Right Away.

### **Office Hours (MST)**

My office hours will be 3:00-4:00PM on Tuesdays and Thursdays, and by appointment. I will make every effort to be on Zoom at those times. However, an emergency might arise that prevents me from being present during my office hours. If I have a preplanned conflict with my office hours, I will let you know with an announcement.

### **Email**

My email address for this course is [csccramer@nmsu.edu](mailto:csccramer@nmsu.edu). Per university policy, I can only contact you using your NMSU email address. I will try to respond to all emails within 24 hours during the week and 72 hours if on the weekend. If you email a completed assignment, I will send you an acknowledgement when I receive the assignment from you. If you do not receive an acknowledgement from me, consider that I did not receive it.

### **Phone Number**

My phone number is (575) 646-2657. If I do not answer your phone call, please leave a message. I will try to respond to all phone calls within 24 hours during the week and 72 hours if on the weekend.

### **Prerequisites**

ANSC/AGRO/BIOL/GENE/HORT 305 or GENE 315 and GENE 320.

### **Required Technical Skills**

Taking this course requires a number of technical skills as well as other soft skills. However, at a minimum you will need to meet certain technology responsibilities to complete work for this course. If you have questions about technical requirements for the course, please contact me immediately.

To begin in this course, you must:

- Read this syllabus carefully and contact me immediately if you have any questions. You are responsible for the content and assignments in this syllabus.
- Be able to obtain access to an internet connection, preferably broadband, and a working computer for the duration of this course.
- Be Proficient with Microsoft© Office applications.
- Be able to conduct research searches on the Internet; see the [NMSU Library](#) and [Research Help for Students](#)
- Find resources on the Internet; see [Internet Tutorials](#)
- Be able to send and receive emails and email attachments in and out of class.

- Know how to change your Canvas Notification settings.
- Know how to read email in Canvas.
- Know how to use Zoom and have Zoom available for use.
- Maintain backups of all work you create for this course.

## Course Expectations

You will be expected to read certain course material and conduct work outside of class time before coming to class. This work will require a time commitment on your part. I highly recommend that you devote sufficient time outside of class to this course in order to stay current in the course.

Attendance and participation are required for all class periods. I will take attendance on Zoom for each class period. You will also be expected to participate in the class whether that be on Canvas or Zoom. I will try to grade and return assignments to you within 1 week of their submission. I will try to help you as much as possible with all aspects of the course. Please ask if you are having trouble.

## Grading Policy

Assignments	Points	Weight
Group Project	225	40.9%
Small Assignments	190	34.5%
Midterm Exam	75	13.6%
Participation	60	10.9%
Total	550	100%

## Grading Criteria

Points	Grade
533-550	A+
502-532	A
495-501	A-
479-494	B+
447-478	B

440-446	B-
424-439	C+
392-423	C
385-391	C-
369-384	D+
337-368	D
330-336	D-
329 and Below	F

### Assignments

**Exams:** There will be one exam given during the course. This midterm exam will be worth 75 points. The exam will cover material discussed in class prior to the exam. The exam will be a take home exam that you will receive on October 6, 2020 and it will be due on October 13, 2020. If you are having some difficulty understanding the material covered by the midterm exam, please get in touch with me but please do not wait until the last minute to do so. Please complete the exam independently and do not compare your answers with another student in class.

**Group Project:** For this project, your group will write a paper and prepare a presentation about breeding of a particular plant species. I would like you to select one of the plant species selected by one of your group members for the plant domestication assignment. In both the paper and the presentation, you will need to introduce your plant species, i.e. background information, importance, biology, important traits, uses, etc. Next, you should talk about if breeding work has been done with your plant species and the inheritance of important traits. Please keep in mind the subjects relative to this course when writing your paper.

You will need to cite the information that you collected and placed into your paper. When listing references, please include the page or page address in which information was retrieved. Please include citations within the text of your essay. Please do not copy word for word or slightly paraphrase any information from your references and include this information in your paper, as this is plagiarism. Please see below about my policy regarding plagiarism. If you are unsure about plagiarism, please ask me first before you submit your project paper. I would like you to submit a practice evaluation of your paper for plagiarism using Turnitin. A sample assignment for Turnitin submission for the rough draft will be created so you can see prior to submitting the final version of your rough draft whether portions of your paper have been plagiarized. If you are having trouble viewing or interpreting the results from Turnitin, I can help you. I would highly recommend that you use Turnitin to scan your paper to see if any portions of your paper can be found elsewhere. Please do this before you submit your paper to me. I will use Turnitin to evaluate your submitted rough draft for plagiarism.

The paper is to be typed, 12 point font, 1" margins, at least 6 pages double-spaced, and no more than 15 pages not including references. An outline of your paper is due October 8, 2020. A rough draft of the paper is due on November 17, 2020 and the final copy of your paper is due on December 8, 2020. Please email me a copy of your outline and rough draft. I will read over the outline and rough draft copy, offer suggestions for improvement, and return the copy back to you. I strongly recommend, encourage, and persuade that you incorporate these suggestions. The rough draft and final version of your paper will be graded on content, grammar, rough draft submission, and following of guidelines. There will be more points associated with the rough draft than the final version. I would like you to put more effort into writing a high-quality, well-developed rough draft.

In addition to the paper, your group will write a grant proposal to Specialty Crop Block Grant program administered by the New Mexico Department of Agriculture. The subject of this proposal will be to establish a breeding program focusing on the plant species you have selected for the subject of your paper. In the proposal, you will need to convince the proposal reviewers that your proposal and in turn the new breeding program should be funded. Before you can write the proposal, your group needs to decide what traits to breed for, what breeding methods you will use, what your breeding objectives are, how long the process will take, how much it will cost, etc. I highly recommend that you start with an outline before you write the entire proposal. You will need to think about how your breeding program and plant species will benefit economically the growers here in New Mexico. I will provide you the questions asked in the proposal submission process. I will also provide you examples of proposals submitted to the funding program in the past. The completed grant proposal is due on December 8, 2020.

Your group will also make a presentation on Zoom at the end of the semester regarding your plant species. In the presentation, you will discuss most of the information presented in your paper and also discuss your grant proposal. The entire group project will be worth 225 points. Those points will be divided in the following manner: outline of paper (10 points), rough draft of paper (60 points), final version (30 points), grant proposal (75 points), and presentation (50 points).

Each group member is expected to contribute equally to all aspects of the group project. For each individual assignment of the group project, you will be asked to apportion 100% to all group member relative to the contribution they made toward the assignment. The apportions will be averaged for each group member. For example, if each group member apportion their effort and the effort of their other group members as 33.3%, then each group contributed equally to that assignment.

**Small Assignments:** Throughout the semester, you will be given small, short assignments to complete before or after a particular subject matter has been covered in class. The assignments will reinforce subject matter covered in class. The assignments will vary depending upon the subject matter being covered. The due date of the assignment will vary for each assignment. There will be 190 points allotted for the total of small assignments. Please complete the small assignments independently and do not compare your answers with another student in class. If

you are having trouble with a particular small assignment, please get in touch with me. Please do not wait until the day before the assignment is due to come and see me. I will try to return your graded assignment by the next class period. Small assignments can be turned in late provided that they are turned in prior to the graded assignments being returned to the rest of the class. If a small assignment is not turned in prior to the return of the graded assignment to the class, the assignment will receive a zero score unless you have a valid excuse. For each day that the assignment is late, 10% of the total points will be deducted prior to grading the assignment.

### **Attendance and Participation**

Attendance and participation are required for all class periods. I will take attendance on Zoom for each class period. You will also be expected to participate in the class whether that be on Canvas or Zoom. In addition to your audio, I would like you to activate your video when you are speaking within Zoom. You may miss class provided that you have a valid excuse. The valid excuse may include death of relative, terminally ill relative, personal sickness (must bring note from doctor stating that you receive medical attention for your illness), or school-related sports function or activity that you are participating in (you must provide me with a letter from the faculty advisor for your club or organization responsible for the trip **BEFORE** you miss class). Valid excuses may be verified at the discretion of the instructor. Please contact me via office phone number (leave a message if I'm not there) or email **BEFORE** you miss class. Invalid excuses will be determined at the discretion of the instructor and include, but are not limited to: overslept, did not feel well, tired, went last time, had to work, had a field trip in another class, had to study for a test in another course, or got back late from trip.

### **Class Policies**

Attendance and participation are required for all class periods. I will take attendance on Zoom for each class period. Zoom class periods will be recorded. You will also be expected to participate in the class whether that be on Canvas or Zoom. You may miss class provided that you have a valid excuse. The valid excuse may include death of relative, terminally ill relative, personal sickness (must bring note from doctor stating that you receive medical attention for your illness), or school-related sports function or activity that you are participating in (you must provide me with a letter from the faculty advisor for your club or organization responsible for the trip **BEFORE** you miss class). Valid excuses may be verified at the discretion of the instructor. Please contact me via office phone number (leave a message if I'm not there) or email **BEFORE** you miss class. Invalid excuses will be determined at the discretion of the instructor and include, but are not limited to: overslept, did not feel well, tired, went last time, had to work, had a field trip in another class, had to study for a test in another course, or got back late from trip. If you miss 5 or more class periods (excused or unexcused) by October 15, you will need to meet with me to discuss your future involvement in the course or you will be withdrawn from the course. If you miss 10 or more class periods (excused or unexcused) by December 3, you will receive an I (incomplete) for the course regardless of your performance up to that point.

### **Honors Course Opportunity**

Students who wish to have this course count as an Honors course may do so by completing the Course by Contract form: <https://honors.nmsu.edu/for-students/honors-courses-by-contract/>. I will assign you additional work that will permit you to gain Honors credits for this course in your major. These credits will count as upper division credits towards the accumulation of 18 credits needed to graduate with University Honors. For additional information on pursuing the Honors recognition at graduation, contact the Honors College at 575-646-2005 or email Dean Chaiken at [mchaiken@nmsu.edu](mailto:mchaiken@nmsu.edu). Completed Contract forms must be submitted in person to the Honors College no later than 1 week after the beginning of each semester.

### **Late Work**

Assignments may be turned in late. For each day that an assignment is late, 10% of the total points will be deducted prior to grading the assignment

### **Academic Integrity and Misconduct**

The Student Code of Conduct defines academic misconduct, non-academic misconduct and the consequences or penalties for each. The Student Code of Conduct is available in the NMSU Student Handbook online: <http://studenthandbook.nmsu.edu/>

According to the NMSU Student Handbook,  
"Academic misconduct includes, but is not limited to...

1. Cheating or knowingly assisting another student in committing an act of cheating or other forms of academic dishonest;
2. Plagiarism, which includes but is not necessarily limited to, submitting examinations, themes, reports, drawings, laboratory notes, undocumented quotations, computer-processed materials, or other material as one's own work when such work has been prepared by another person or copied from another person;
3. Unauthorized possession of examinations, reserve library materials, or laboratory materials;
4. Unauthorized changing of grades on an examination, in an instructor's grade book, or on a grade report; or unauthorized access to academic computer records;
5. Nondisclosure or misrepresentation in filling out applications or other University records in, or for, academic departments or colleges."

The following are possible sanctions that may be imposed on individual students for infraction of regulations:

1. Disciplinary probation
2. Disciplinary suspension

3. Dismissal
4. Expulsion

At the very least, an instructor may find it appropriate to give a zero grade (F) for the plagiarized work, or for the entire course. This information can also be found here:

<http://studenthandbook.nmsu.edu/student-code-of-conduct/academic-misconduct/>

Additional comments about plagiarism: Plagiarism includes copying entire sentences or paragraphs from a scientific paper, web site, etc. when writing a journal, essay, etc. This means that students must use their own words when writing any assignment. Also, any information gathered from another source must be referenced, and this information must be stated in your own words and not the words of the original author. Assignments will be checked for acts of plagiarism. A single plagiarized sentence in an assignment will result in a zero for that assignment. The instructor will strongly enforce this!! Also there are many tools on the web that an instructor can use to determine if some writing has been plagiarized.

## Technology Requirements

### Computer Hardware & Software

- Access to a Windows or Macintosh desktop computer or laptop with internet access, sound, camera, and speakers
- Canvas Learning Management System
- Microsoft Office 2007 or higher
- Adobe Reader (for reading PDF files)
- Zoom
- Learning Management System
- [Instructure Canvas](#)
- [Canvas Instructions](#)

### Web Browsers

Use the following browsers in Canvas. Please remember to update the web browser you are using to access Canvas. Internet Explorer is not recommended for use with Canvas at this time.

- [Firefox](#)
- [Chrome](#)
- [Safari](#)

Canvas does not fully support mobile devices; while there is a free Canvas mobile app available through iTunes store, a lot of functionality is unavailable when using a mobile phone. When you take this course, it is assumed you have access to a computer or laptop for full access to functionality in this course.

## Discrimination and Disability Accommodation Accessibility

Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act Amendments Act (ADAAA) covers issues relating to disability and accommodations. If a student has questions or needs an accommodation in the classroom (all medical information is treated confidentially), contact:

Main Campus

Student Accessibility Services (SAS)

Corbett Center Student Union Rm. 208

Trudy Luken, Director

Phone: (575) 646-6840 E-mail: [sas@nmsu.edu](mailto:sas@nmsu.edu)

Website: <http://sas.nmsu.edu/>

New Mexico State University, in compliance with applicable laws and in furtherance of its commitment to fostering an environment that welcomes and embraces diversity, does not discriminate on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex (including pregnancy), sexual orientation, spousal affiliation, or protected veteran status in its programs and activities, including employment, admissions, and educational programs and activities. Inquiries may be directed to the Laura Castille, Executive Director, Title IX and Section 504 Coordinator, Office of Institutional Equity, P.O. Box 30001, E. 1130 University Avenue, Las Cruces, NM 88003; 575.646.3635; 575-646-7802 (TTY); [equity@nmsu.edu](mailto:equity@nmsu.edu). Thank you for reading the syllabus up to this point. If you send me an email within the first two weeks of class stating that you have read the entire syllabus, I will give you five course points.

Furthermore, Title IX prohibits sex discrimination to include sexual misconduct: sexual violence (sexual assault, rape), sexual harassment and retaliation.

Title IX prohibits sex harassment, sexual assault, intimate partner violence, stalking and retaliation. For more information on discrimination or Title IX, or to file a complaint contact:

Laura Castille, Executive Director and Title IX Coordinator

Office of Institutional Equity (OIE) - O'Loughlin House, 1130 University Avenue

Phone: (575) 646-3635 E-mail: [equity@nmsu.edu](mailto:equity@nmsu.edu)

Website: <http://equity.nmsu.edu/>

### Other NMSU Resources:

NMSU Police Department: (575) 646-3311 [www.nmsupolice.com](http://www.nmsupolice.com)

NMSU Police Victim Services: (575) 646-3424

NMSU Counseling Center: (575) 646-2731

NMSU Dean of Students: (575) 646-1722

For Any On-campus Emergencies: 911

## Syllabus Modifications Statement

The information in this syllabus is subject to change at the instructor's discretion. Students will be notified of any changes in the syllabus during the semester. If you have any questions, please ask.

## Course Schedule

Date	Topic	Date	Topic
Aug 20	Course Introduction	Oct 13	Inbreeding and Heterosis
Aug 25	Introduction to Plant Breeding	Oct 15	Genotype x Environment Interaction
Aug 27	Plant Domestication	Oct 20	Gains from Selection
Sep 1	Plant Traits	Oct 22	Maximizing Genetic Improvement
Sep 3	Trait Variation	Oct 27	Molecular Markers & Marker Assisted Breeding
Sep 8	Quantitative Genetics Review	Oct 29	Specific Crop Breeding
Sep 10	Heritability	Nov 3	Genetic Mapping: QTL analysis and GWAS
Sep 15	Breeding objectives	Nov 5	Specific Crop Breeding
Sep 17	Breeding objectives	Nov 10	High Throughput Phenotyping
Sep 22	Breeding objectives	Nov 12	Specific Crop Breeding
Sep 24	Crop Germplasm Resources	Nov 17	Genomewide selection & Gene Editing
Sep 29	Classical Breeding Methods	Nov 19	Breeding Program Management
Oct 1	Classical Breeding Methods	Dec 1	Cultivar Release and Commercial Seed Production
Oct 6	Classical Breeding Methods	Dec 3	Presentations
Oct 8	Classical Breeding Methods	Dec 8	Presentations