Hereditary and Population Genetics

Instructor Information

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Office hours – 2:45-3:45PM on Mondays, 3:30-4:30 PM on Tuesdays, 3:15-4:15 PM on Wednesdays, & by appt

Course Information

GENE 320 – Hereditary and Population Genetics
Spring 2022
Log into Canvas at http://learn.nmsu.edu using your NMSU username and password

Course Description

This course explores fundamental principles of reproduction, variation, and heredity in plants and animals including: Mendelian inheritance, mitosis, meiosis, genetic linkage, random mating, genetic drift, natural selection, inbreeding migration, mutation, interrelationships between individuals, populations and communities and the environment.

Course Delivery Method

This course is structured slightly differently than other courses. You will be expected to read certain textbook chapters and view lecture presentation movies online 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 first half of the semester, you will be quizzed at the beginning of class to determine if you have prepared for class by reviewing the requested material before class. We will save class time for discussion, problem solving, group work, demonstrations, question and answer sessions, etc. For the first half of the semester, there will be very little lecturing on my part during class.

Course Objective

Students will learn the fundamental theories of transmission and population genetics and be able to apply them in real life scenarios.

Textbooks and Materials

The required textbook for this course is *Transmission and Population Genetics*, *4th ed*, by Benjamin Pierce, W. H. Freeman and Co. publishers, 2012. ISBN-10:1-4292-5494-7. The third edition would also work for this course. You are expected to read the chapters of the book that pertain to the material being covered in class. In addition, you are expected to bring your textbook to each class period.

Communication

I prefer to communicate with you face to face in person or via Zoom. In the event that I am not able to communicate to you face to face, I will either email you or send an announcement within Canvas. I would prefer that you communicate with me face to face in person or 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 face to face, 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 2:45-3:45PM on Mondays, 3:30-4:30 PM on Tuesdays, 3:15-4:15 PM on Wednesdays, and by appointment. I will make every effort to be in my office and on Zoom at those times. My Zoom link for office hours will be https://nmsu.zoom.us/j/4434419420. However, an emergency might arise that prevents me from being present for 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 cscramer@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 me 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

CHEM 1215G, BIOL 2110G or equivalent courses. Please let me know if you have not taken one or more of these courses.

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.
- Maintain backups of all work you create for this course.

Course Expectations

You will be expected to read certain textbook chapters and view lecture presentation movies online 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. Attendance will be taken by the instructor. Please complete the homework assignments and exams independently and do not compare your answers with another student in class. 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	Units	Points	Weight
Exams	3	150	27.3%
Heredity Project	1	75	13.6%
Homework Assignments	6	180	32.7%
Course points	1	145	26.4%
Total	11	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

Quizzes: For the first half of the semester, there will be a short, multiple-choice quiz prior to the start of a new unit. Starting with the Linkage and Recombination unit, the quizzes will occur at the end of the unit. You are expected to read the respective chapter in the textbook and view my lecture presentation on Canvas that pertains to that unit. The quizzes assess whether you have prepared for class and are ready to learn. This preparation outside of class is essential for success in this course. In class, you will take the quiz individually. Once all of the members of your group have finished the quiz, you will work collectively on completing the quiz. Your first quiz will be on Mendelian Genetics. If you miss a quiz, you will not be able to retake it later. Tentative dates for quizzes are: January 19 (Mendelian Inheritance), January 28 (Modifications of Basic Principles), February 7 (Sex Determination/Sex Linked Traits), February 14 (Modifications of Basic Principles2), February 21 (Pedigree Analysis), March 28 (Linkage & Recombination), April 11 (Quantitative Genetics), May 2 (Population Genetics).

Course points: There will be quizzes at the start of class that will be counted towards course points. In addition, there will be assignments, class exercises, problem solution demonstration, group projects, etc. that take place during class that will count towards course points. You will have multiple opportunities to earn course points throughout the semester. The amount available will exceed the total awarded for the course. For example, the total number of course points for the semester may add up to 200 points. So you can miss some points without the loss detrimentally affecting your grade. Only a total of 145 course points can be earned for the

semester. If you exceed this amount, the extra course points may be counted as extra credit points provided that you have not exceeded the total number of allowable extra credit points.

Exams: There will be three exams given during the course. Each exam will be worth 50 points. The exams will cover material discussed in class prior to the exam. The exams will be take home exams that you will have one week to complete. Exam 1 will be due on February 11, exam 2 will be due on April 4, and exam 3 will be due on May 5. The exams will not be cumulative, however, some information may build upon what you have learned in a previous unit. If you are having some difficulty understanding the material covered by the upcoming exam, please come by and see me but please do not wait until the last minute to do so. Please complete the exams independently and do not compare your answers with another student in class.

Heredity Project: For this project, you will select 5 Mendelian-inherited traits in humans. Please discuss how these traits are inherited, the different phenotypes and genotypes associated with the traits, and the different alleles associated with the traits. Please select traits that show some variation in your family. Next you will look at the phenotype that you possess for those five traits. I would like you to determine the phenotypes that your siblings, parents, and grandparents possess or possessed. If members of your family are no longer alive, please try to do the best that you can. From this information, try to determine the genotype that each of your relations possesses(d) for these traits. Then construct a family tree for each trait that shows your family member and their phenotype and genotype. If you are currently married or have a significant other, please try to determine the possible phenotypes and genotypes for these five traits of any future children that you might have together. Please try to do your best estimating the phenotypes and genotypes of your significant other and their relations. Finally, please determine the origin of each of your alleles for each trait.

Please write all of this information up into a 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 paraphase 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 heredity project 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.

If possible, please include photos of the traits that you are discussing. For each trait, please include a pedigree that illustrates the inheritance of the respective trait. If you have any questions about how to write your project, please ask. The paper is to be typed, 12 point font, 1”

margins, at least 6 pages double-spaced, and no more than 12 pages not including references and pedigrees. By February 18, please let me know what 5 Mendelian-inherited traits you will be studying in your family and what family members you will be including in your pedigree. By this time, please have already contacted your respective family members about your project and their cooperation with your effort. Also please confirm that the traits that you selected are controlled by one or two genes and that your family shows some variation for the trait. If you are having trouble selecting traits, please come and see me before the due date and I can help you. I would also recommend that you start out with more than 5 traits in case there is no variation or you can't gather enough information for a trait from your family members. If you have information on more than five traits, you will only need to contact your family members once. A rough draft of the paper is due on March 18, 2022 and the final copy of paper is due on April 22, 2022. Please email me a copy of the rough draft. I will read over the 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 into your paper. The written essay 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 copy. I would like you to put more effort into writing a high-quality, well-developed rough draft.

At the course website, I provide examples of heredity projects that have been written by previous students and have been graded favorably. I also provide a sample pedigree in PowerPoint format that can be used and modified for your projects. In addition, I provide a grading rubric that I will use to grade your project. Please avail yourself of these resources as they will save you time and assist you in getting a better grade. Please work on this project individually and independently. Please start this project early as it takes time to decide what traits to use, to find variation for those traits in your family, and to contact all of the respective family members.

Homework Assignments: Throughout the semester, you will be given homework assignments after a particular subject matter has been covered in class. The assignments will reinforce subject matter covered in class. The questions on the assignments will be in a similar format as the questions presented on the exams. You will be given one week to complete these assignments. There will be 180 points allotted for the homework assignments. Please complete the homework assignments independently and do not compare your answers with another student in class. If you are having trouble with the problems on the homework assignment, please come and see me. Please do not wait until the day before the assignment is due to come and see me. I will try to return the graded homework by the next class period. Homework assignments can be turned in late provided that they are turned in prior to the graded homework assignments being returned to the rest of the class. If a homework assignment is not turned in prior to the return of the graded homework 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.

Group Projects: Throughout the semester, there will be several group projects in which you will get real-world experience in applying what you have learned to solve problems. You will be

expected to apply what you have learned in order to solve these problems. You will be expected to work with other individuals in your group and to contribute an equal share to the work required for each project. Please let me know if you are having trouble working in your group. The points associated with each project will vary and they will be counted towards your course points.

Extra Credit Opportunity

There may be opportunities for extra credit during the semester. For example, I often give extra credit for completing a student course evaluation. In addition, if you have exceeded the maximum allowed number of course points, your excess course points will count towards your extra credit total. You will be limited to a total of 20 extra credits points for the semester from all sources.

Attendance and Participation

Attendance and participation are required for all class periods. 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. You are expected to participate during class. If you miss 8 or more class periods (excused or inexcused) by March 17, 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 inexcused) by May 2, you will receive an I (incomplete) for the course regardless of your performance up to that point. It is important that you attend class regularly.

Class Policies

Because of the current COVID-19 restrictions, students are expected to follow the "New Mexico State University COVID-19 Safety Commitment Statement". As part of this commitment, students in the course are expected to protect their own health, protect the health of other students in the course, and protect the health of those in the greater university community.

Attendance and participation are required for all class periods. Attendance will be taken by the instructor. 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. 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. You are expected to participate during class. If you miss 8 or more class periods (excused or inexcused) by March 17, 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 inexcused) by May 2, 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. 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

Information about academic integrity and misconduct can be found here - https://provost.nmsu.edu/faculty-and-staff-resources/syllabus/policies.html

Technology Requirements

Computer Hardware & Software

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

Information regarding discrimination and disability accommodation accessibility can be found here - https://provost.nmsu.edu/faculty-and-staff-resources/syllabus/policies.html

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
Jan 12	Introduction	Mar 7-11	No class
Jan 14	Introduction	Mar 14	Linkage & Recombination
Jan 17	No class	Mar 16	Linkage & Recombination
Jan 19	Mendelian Inheritance	Mar 18	Linkage & Recombination
Jan 21	Mendelian Inheritance	Mar 21	Linkage & Recombination
Jan 24	Mendelian Inheritance	Mar 23	Linkage & Recombination
Jan 26	Mendelian Inheritance	Mar 25	Linkage & Recombination
Jan 28	Modifications of Basic Principles	Mar 28	Linkage & Recombination
Jan 31	Modifications of Basic Principles	Mar 30	Quantitative Genetics
Feb 2	Modifications of Basic Principles	Apr 1	Quantitative Genetics
Feb 4	Modifications of Basic Principles	Apr 4	Quantitative Genetics

Feb 7	Sex Determination/Sex Linked Traits	Apr 6	Quantitative Genetics
Feb 9	Sex Determination/Sex Linked Traits	Apr 8	Quantitative Genetics
Feb 11	Sex Determination/Sex Linked Traits	Apr 11	Quantitative Genetics
Feb 14	Modifications of Basic Principles2	Apr 13	Population Genetics
Feb 16	Modifications of Basic Principles2	Apr 15	No class
Feb 18	Modifications of Basic Principles2	Apr 18	Population Genetics
Feb 21	Pedigree Analysis	Apr 20	Population Genetics
Feb 23	Pedigree Analysis	Apr 22	Population Genetics
Feb 25	Pedigree Analysis	Apr 25	Population Genetics
Feb 28	No class	Apr 27	Population Genetics
Mar 2	No class	Apr 29	Population Genetics
Mar 4	Pedigree Analysis	May 2	Population Genetics