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# BILD 20: Human Genetics in Modern Society

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**Lectures:** TU & TH 5:00 pm - 6:20 pm  
In-Person Lectures at TATA3201  
ZOOM Lectures: <https://uchealth.zoom.us/j/83015016614>

**Instructor:** Brinda K. Rana, Ph.D. Contact Instructor Via Canvas Email

**Graduate Teaching Assistant:** Adee Newman

**Undergraduate Instructional Assistant:** Sean Kang

## Course Description

This course will introduce students to the principles of genetic inheritance in human populations and current applications of human genetics and genomics in medicine, behavioral research, and society.

## Learning Objectives

- ❖ Understand the nature of genetic variation and how it contributes to phenotypic variation and disorders.
- ❖ Learn about the various study designs applied to investigate the role of genes versus the environment in phenotypic variation.
- ❖ Learn how to conduct a hypothesis test.
- ❖ Use online resources to investigate genetic variants and their role in phenotypic variation and disorders.
- ❖ Develop skills to read and critically evaluate genetic reports in the media.

## Grading

A total of 400 points are available for the course. Grades are based on the total number of points earned through the evaluation (see right column):

- ≥360 points (90%) A (A+, A or A-)
- ≥320 points (80%) B (B+, B or B-)
- ≥280 points (70%) C (C+, C or C-)
- ≥240 points (60%) D

Cutoffs may be adjusted downward so that at least 50% of students receive an A or a B, but cutoffs will not be adjusted upward for any reason.

## Assessments

### Midterm (100 points)

(Nov 2) 100 pts (80 minutes)

### Quizzes (30 pts)

Three 15-minute quizzes (10 pts each) on Canvas. Each quiz will be based on the Problem Sets posted on Canvas.

### Class Participation (30 pts)

You will receive points for participating in activities in lecture and discussion section, and Canvas.

### Group Project Presentations (80 points)

Thursday, Dec 5th, 6th, OR 7<sup>th</sup> (sign up for a timeslot on CANVAS>PEOPLE>GROUP PROJECTS)

### Final Exam (160)

12/15/2022 700 pm-10:00 pm  
Location TBA by Registrar

Date	Lecture Schedule
Thursday September 28	Lecture 1: Course Introduction Mendelian Patterns of Inheritance: From Peas to Humans <i>PRE-RECORDED VIDEO NO IN PERSON LECTURE</i>
Tuesday Oct 3	<i>Class meets on ZOOM</i> <i>ZOOM Breakout Room Activity: Concept Maps</i> Lecture 2: The DNA Molecule and the Central Dogma of Molecular Biology
Thursday October 5	<i>Class meets on ZOOM</i> <i>ZOOM Breakout Room Activity</i> Lecture 3: The Scientific Method & Hypothesis Testing Applied to Mendelian Patterns of Inheritance Chromosomal Theory of Inheritance & Meiosis
Tuesday October 10	<i>Class meets on ZOOM</i> Lecture 4: Sex Determination, Dosage Compensation, and the Lyon Hypothesis Modification of Mendelian Ratios Part 1
Thursday October 12	<i>Meet in-person at TATA Hall</i> <i>In Class Activity: DNA Extraction</i> Lecture 5: Modification of Mendelian Ratios Part 2
Tuesday October 17	<i>Meet in-person at TATA Hall</i> Lecture 6: Human Population Genetics Genetic Adaptation & Modern Human Evolution: Lactose Intolerance Lactose Intolerance <b><i>Online QUIZ 1 (Lectures 1-3; Problem Set 1)</i></b>
Thursday October 19	<i>Meet in-person at TATA Hall</i> Lecture 7: Genetics of Complex Traits and Diseases: Human Pigmentation
Tuesday October 24	<i>Meet in-person at TATA Hall</i> Lecture 8: Genetic Association Studies & Molecular Genetic Techniques <b><i>Online QUIZ 2 (Lectures 1-6; Problem Set 1-2)</i></b>
Thursday October 26	<i>Class meets on ZOOM</i> Lecture 9: <b><i>Meet with Genetic Counselors</i></b> <i>Be prepared to join in breakout room activities with the presenters.</i>
Tuesday October 31	Lecture 10: Eugenics (online lecture and activity) & The Belmont Report <i>PRE-RECORDED VIDEO NO IN PERSON LECTURE</i>
Thursday November 2	<b><i>MIDTERM (Lectures 1-9; On CANVAS)</i></b>
Friday November 3	<b><i>Optional Activity: CARTA Public Symposium</i></b> <b><i><a href="https://carta.anthropogeny.org/">https://carta.anthropogeny.org/</a> (Instructions will be posted on CANVAS; May substitute for Quiz grade)</i></b>
Tuesday November 7	<i>Class meets on ZOOM</i> Lecture 11: <b><i>Twin Genetics and Studies of Cognition and Alzheimer's Disease</i></b> <b><i>Guest Lecturer:</i></b> Jeremy Elman, Ph.D. Assistant Professor, UCSD Department of Psychiatry

Thursday November 9	<i>Meet in-person at TATA Hall</i> Lecture 12: COVID-19 Related Genetics <b>Group Final Project Sign-Up Deadline</b>
Tuesday November 14	<i>Class meets on ZOOM</i> Lecture 13: Gene Editing, CRISPR & Ethical Challenges <b>Online QUIZ 3 (Lectures 1-11; Problem Set 1-4)</b>
Thursday November 16	<i>Meet in-person at TATA Hall</i> Lecture 14 Epigenetics
Tuesday November 21	<i>Class meets on ZOOM</i> Lecture 15: Pharmacogenetics Cancer Genetics
Thursday November 23	<b>Thanksgiving Holiday! No class</b>
Tuesday November 28	<i>Comparative Anthropogeny PRE-RECORDED VIDEO</i> <b>Genetic Adaptation in the Human Population</b> <b>Guest Lecturers:</b> Tatum Simonson, Ph.D., Associate Professor, UCSD SOM Division of Physiology "Genetics of High-Altitude Adaptation" <b>Studying Genetics in the Community Guest Lecture:</b> James Yu, UCSD Department of Medicine, Biomedical Sciences Graduate Program "High-Altitude Adaptation Studies in Nepal" <b>Group Project Summary Deadline (11pm)</b>
Thursday November 30	<i>Meet in-person at TATA Hall</i> Lecture 17: Personalized Medicine & Direct-to-Consumer Testing Course Summary
Tuesday December 5	Group Projects presented on ZOOM between 5pm-9:50pm. Students are required to be present on ZOOM during the 1 hour block of their presentation.
Wednesday December 6	Group Projects presented on ZOOM between 10am-noon. Students are required to be present on ZOOM during the 1 hour block of their presentation.
Thursday December 7	Group Projects presented on ZOOM between 5pm-8 pm. Students are required to be present on ZOOM during the 1 hour block of their presentation.
Friday December 15	<b>Final Exam (in-person)</b>

## LECTURES

When possible, lectures will be recorded and available on CANVAS. However, we recommend that you join the live lecture when possible. The benefits of in-person learning in this class will include interacting with scientists who are world renowned in their fields, practicing communicating scientific concepts with your peers and mentors, and it will be fun!

## PROBLEM SETS & READINGS

Problem sets to be discussed in Discussion Sections and readings for each week will be posted on TritonEd. Klug et al. Essentials of Genetics, 9<sup>th</sup> edition is a good reference. You are not required to purchase this textbook. The 8th edition is equally useful and you may be able to find the 8th edition at a discounted price online.

## DISCUSSION SECTIONS

Attendance at weekly discussion sections is required. The discussions are designed to help you develop the skills in problem solving and data analysis that will be important on the exams and provide you with the opportunity to build relationships with fellow students and your TA.

## GROUP PROJECTS

Students will work in groups of 5-6 to create an 8-minute presentation of a genetics topic of your choice. The videos will be presented Dec 5-7. All group members must attend the presentation during their chosen timeslot. Students who anticipate issues with attending should discuss options with the instructor before November 22. Group sign-ups will be on CANVAS.

## MIDTERM EXAM AND QUIZ INFO AND POLICIES

If you have an illness, injury or personal crisis that you believe will prevent you from performing adequately on an exam, contact the instructor about this problem before the exam to discuss your options. Students facing unstable internet issues should contact the instructor before the exam for accommodations. A missed exam receives 0 points and there will be no make-up exam for any reason.

**Midterm and Final Exams.** The midterm will be taken on Canvas and will be open book. The final exam will be taken in person. An 8.5 x 11 inch page of notes (both sides) and a calculator will be permitted at the final exam. Phones or other electronic devices may NOT be used during the final. **Quizzes** will be available to take on CANVAS at 6:00am (PST) on the date of the quiz and will remain open until 11pm that day. The quizzes are designed to be completed within 10 minutes. Quizzes are open book but not open to discussion with other humans.

Students with accommodations for exams from the Office of Students with Disabilities must provide their accommodation letter to Dr. Rana at the beginning of the quarter or as soon thereafter as the letter becomes available. Please contact Dr. Rana about a week before each exam to arrange for your accommodation. Please speak with your TA regarding how your accommodation will be applied to quizzes.

If you find an error in the grading of your exam, you can request a regrade by submitting your exam to Dr. Rana in class with a note attached explaining the grading error. The deadline for a re-grade on the midterms is 10 days after taking the midterm. No requests will be considered after this time, except for correction of point addition errors. If you believe there was an error in the grading of one of your quizzes, you must raise this concern within 5 days of the quiz.

## ACADEMIC DISHONESTY

Academic dishonest (aka cheating) will not be tolerated in this class. According to UCSD policy, academic dishonesty includes:

- taking an exam for another student
- allowing another student to take an exam for you
- copying another student's work on an exam or quiz
- allowing another student to copy your work
- altering graded assignments and submitting them for a regrade
- utilizing tutors (e.g. online, in-person, phone, text) during exams and quizzes

Any student caught or suspected of violating the principles of academic integrity at UCSD by doing one of the things on the list above will be reported to the UCSD Academic Integrity Coordinator and the Dean of the student's college. Confirmed cases of cheating will result in a reduction in the student's grade – violations determined by the instructor as particularly serious (e.g. cheating on an exam or repeated instances of cheating) will result in the student receiving an F as their final grade as well as other disciplinary actions determined appropriate by the Academic Integrity Coordinator.