

# BILD 20: Human Genetics in Modern Society

2019 Fall Quarter

Lectures: Tu & Th 5:00-6:20 pm in TATA 3201

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Instructor Office Hours: By appointment

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## Graduate TA

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### Course Description

This course will introduce students to the principles of genetic inheritance in human populations and current applications of genetics and genomics in medicine, 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.
- Develop mathematical/statistical skills to analyze genetic data.
- Learn how to use online resources to learn about genetic variants and their role in phenotypic variation and disorders.
- Develop skills to read critically evaluate genetic reports in the media.

### Grading

A total of 500 points are available for the course. Grades are based on the total number of points earned through the evaluation (see right column):

≥450 points (90%) A (A+, A or A-)

≥400 points (80%) B (B+, B or B-)

≥300 points (60%) C (C+, C or C-)

≥250 points 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 Group Presentations (150 points)

**Date/Time:** In lecture Nov 12 & 14, 2019

#### Final (200 points)

**Date/Time:** Friday, December 13, 2018 7:00-9:59 pm

**Location:** TBA

Covers material from entire course. Multiple Choice. Requires Scantron.

#### Quizzes (80 pts)

Five 20-minute quizzes will be given during sections (Weeks of 10/13, 10/21, 11/4, 11/18, 12/2). Each quiz will be based on the problem sets. The quiz with the lowest score will be dropped.

#### Clickers Questions (50 pts)

Questions will be asked in class that you will respond to using an i>Clicker. Each question is worth 1 point (half for answering at all, another half for answering correctly). Answers will start counting for credit on Oct 3. A cumulative total of your clicker points for the quarter will be posted at the end of each week on TritonEd. Once you reach the maximum possible 50 points, your clicker point total will not go any higher. See Clickers section pg. 3 for more info.

#### Class & Discussion Participation (20 pts)

10 points will be awarded by your instructor for participation in activities in the lecture and an additional 10 points will be awarded by your IA for consistent attendance and high quality participation in discussion sections.

<b>Date</b>	<b>Lecture Schedule</b>	<b>In-class Activity</b>	<b>Mathematical &amp; Statistical Concepts</b>
9/26	1. Course Introduction 2. The DNA Molecule and the Central Dogma of Molecular Biology	DNA Extraction, Concept Map, Concept Inventory	
10/1	Mendelian Patterns of Inheritance	Genetic Terms	Product and Sum Laws of Probability
10/3	1. Chromosomal Theory of Inheritance 2. Meiosis and Genetic Diversity 3. Scientific Method & Hypothesis Testing		Pearson Chi-Square Test
10/8	1. Modification of Mendelian Ratios 2. Sex Determination 3. Dosage Compensation: The Lyon Hypothesis	Reading Pedigrees	
10/10	1. The Gene 2. Genetic Variants and Databases 3. Population Genetics: Hardy Weinberg, natural selection, genetic drift, gene flow	Co-Evolution of Genes & Culture: The Lactase Story	
10/15	Mendelian Diseases and Genetic Counseling <u>Guest Lecture</u> by Genetic Counselors Annina Cooper and Lindsey Schmidt	Pedigree Analysis	
10/17	Complex Traits: Genetics of Mammalian Pigmentation		
10/22	1. Genetic Association Studies 2. Genome Wide Association Studies	Genetics of Taste	P values
10/24	“Genetics of Adaptation: High Altitude Studies in Peru and Nepal” Guest Lecture by Tatum Simonson, Ph.D. and James Yu, Ph.D.		
10/29	“Genetic editing and modern approaches to gene therapy,” Guest Lecture by Katherine McCulloch, Ph.D. and Matt Andrusiak, Ph.D. from Yishi Jin Lab		
10/31	Epigenetics		
11/5	1. Quantitative Genetics 2. Twin Research Part I	Heritability	Variance
11/7	1. Genetic Risk for Disease 2. Twin Research Part II	Reading Genetic Papers	
11/12	Midterm Group Presentations		
11/14			
11/19	“Genetics of Autism,” Guest Lectures by		Variance
11/21	Application of Twin Methods to Psychiatric Genetics and Neurocognitive Aging <u>Guest Lecture</u> by William Kremen, Ph.D., UCSD Department of Psychiatry & the Center for Behavioral Genomics		Multiple Comparisons
11/26	1. Cancer Genetics 2. Pharmacogenetics		
12/3	Direct-to-Consumer Genetics and Applications Personalized Medicine		
12/5	In the Media: Misconceptions in Genetics	Final Review	
12/13	Final Exam		

## 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 will be available in Course Reserves (<https://reserves.ucsd.edu/ares/>). You are not required to purchase this text book. The 8th edition is equally useful and you may be able to find the 8th edition at a discounted price online.

## CLICKERS

You will need an i>clicker for this class – other clicker brands will not work, but any i>clicker model will work. You can buy a new or used one at the UCSD Bookstore or another source. Regardless of where you got it, you will need to register your i>clicker on TritonEd (<https://triton.ed.ucsd.edu/>) to get credit for your responses: after you login and select this class, in the blue menu block on the left click on “i>clicker Registration”. On the next page, enter the serial no. from the back of your clicker. You only need to register the clicker once - if you have done this before for another class at UCSD you are done. DO NOT register your clicker at iclicker.com – this will not get you into the TritonEd database for UCSD classes!! Do not switch clickers mid-quarter unless it is absolutely necessary. If you must switch, notify the instructor because your two clicker response records will need to be manually stitched together. Allowances will not be made for forgotten or malfunctioning clickers (e.g. dead batteries), absence from class regardless of the reason, or adding the class late. There will be enough “extra” clicker questions to give everyone a fair shot at earning the maximum of 50 clicker points in spite of issues such as missed lectures or mechanical failure. **Register by 10 pm Oct 2.**

## DISCUSSION SECTIONS

Weekly discussion sections 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, your tutor, IA or TA. Sections will meet for the first time in week 1 starting Sept 30. A total of five 20-point quizzes will be given in your discussion section. Each quiz will consist of problems and concepts from the homework sets posted on TritonEd at least one week before the quiz. Bring a pen to take the quiz. Every student can drop their lowest quiz score, including zeros resulting from missing section for any reason. Credit will only be given for quizzes taken in the section you are enrolled in.

## MIDTERM PROJECTS

Students will work in groups of 3-4. Groups will submit their topic via TritonEd no later than 10pm on October 18. An electronic version of the report and presentation is to be submitted via TritonEd by every student before lecture on Nov 12. For students choosing the oral presentation project, a 7-10 minute oral presentation in lecture class is required on Nov 12 or 14. All students in the group must participate in the oral presentation. Sign-ups for oral presentation time slots will be conducted by lottery.

## EXAM AND QUIZ INFO AND POLICIES

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 or IA regarding how your accommodation will be applied to quizzes.

After the grading of each exam is completed, you can view your score at the course website in TritonEd by clicking "My Grades" on the left menu below the Syllabus for the course. A weekly update of cumulative clicker points for the quarter will also be posted here at the end of every week. After the quarter ends, your discussion section points (quiz + participation points) and final grade will also be posted here.

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 final is Jan 12, 2019. No requests will be considered after this date, 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 with your TA/IA on the day you receive your quiz back.

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. If you cannot do

this and miss an exam for one of these reasons, contact the instructor as soon as possible. Once you have taken an exam (or part of it), you will not be able to drop the score or negotiate a reduction in its impact on your grade for any reason, so it is imperative that you decide you are well enough to take an exam before it starts. See Discussion Sections for discussion of the impact of missed quiz scores due to absence from Section.

## **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<sup>+</sup>
- responding to clicker questions in class using another student's clicker\*

\* If a student is using more than one clicker, both clickers will be confiscated immediately for the remainder of the class period.

<sup>+</sup>Altering an exam and submitting it for a regrade is a bad idea. Each exam will be photographed prior to returning them to students, and exams handed in for a regrade will be checked against the original.

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.