BILD 20: Human Genetics in Modern Society

FALL 2020
Lectures: TU & TH 5:00pm-6:20pm live online at https://uchealth.zoom.us/j/96935386027
Instructor: Brinda K. Rana, Ph.D.
      Email: Via Canvas
TA Sessions: ZOOM link will be provided to you via Canvas by your TA, IA and tutors.
Website: Log onto your Canvas account at https://canvas.ucsd.edu using the Chrome Browser.

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):
$\geq$360 points (90%) A (A+, A or A-)
$\geq$320 points (80%) B (B+, B or B-)
$\geq$280 points (70%) C (C+, C or C-)
$\geq$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 (180 points)
November 24, 2020 5:00-6:20pm (PST) on CANVAS.

Quizzes (100 pts)
Six 10-minute quizzes (20 pts each) will be given on Canvas. Each quiz will be based on the Problem Sets posted on Canvas. The lowest quiz grade will be dropped. Problem Sets will not be graded.

Class & Discussion Participation (50 pts)
Throughout the course, there will be short online activities and surveys.

Final Group Presentations (70 points)
Finals Week: Friday 12/18 7pm-9:50 pm
Alternate Time: Thu 12/17 11am-2:50pm
Submit Presentations on Canvas by Thursday, 12/17 10 AM.

Date	Lecture Schedule
Thursday October 1	Course Introduction *In Class Activity via Break-Out Rooms* The DNA Molecule, Genetic Variants and the Central Dogma of Molecular Biology
Tuesday October 6	COVID-19 Genetics Mendelian Patterns of Inheritance
Thursday October 8	The Scientific Method & Hypothesis Testing Chromosomal Theory of Inheritance & Meiosis *In Class Activity via Break-Out Rooms*
Tuesday October 13	Mendelian Diseases & Modification of Mendelian Ratios *QUIZ 1* (Lectures 10/1-10/8; Problem Set 1)
Thursday October 15	***Genetic Counseling Guest Lecture***: Yvonne Cardona & Claire Shepard, UCSD Genetic Counseling Program *In Class Activity via Break-Out Rooms*
Tuesday October 20	Human Population Genetics Genetic Adaptation & Modern Human Evolution: Lactose Intolerance Lactose Intolerance *In Class Activity via Break-Out Rooms* *QUIZ 2* (Lectures 10/1-10/15; Problem Set 2)
Thursday October 22	***Genetic Adaptation in the Human Population*** ***Guest Lecture:*** Tatum Simonson, Ph.D., Associate Professor, UCSD SOM Division of Physiology "Genetics of High-Altitude Adaptation" ***Studying Genetics in the Community Guest Lecture:*** James Yu, UCSD Department of Medicine, Biomedical Sciences Graduate Program "High-Altitude Adaptation Studies in Nepal" *Be prepared to join in an interactive discussion with the presenters.*
Tuesday October 27	Genetics of Complex Traits and Diseases *QUIZ 3* (Lectures 10/1-10/22; Problem Set 3)

Thursday October 29	Study Design in Genetics Research
	   Genetic Association Studies: Candidate Gene and GWAS
	   Twin Studies

Tuesday November 3	The NASA Twins Study Sex Determination & Dosage Compensation: The Lyon Hypothesis *QUIZ 4* (Lectures 10/1-10/29; Problem Set 4)
Thursday November 5	Epigenetics *In Class Activity via Break-Out Rooms with Final Exam Groups*
Tuesday November 10	***Genetic Studies of Cognition and Alzheimer's Disease Guest Lecture:*** William S. Kremen, Ph.D. Professor, UCSD Department of Psychiatry *QUIZ 5* (Lectures 10/1-11/5; Problem Set 5)
Thursday November 12	***Polygenic Risk Analysis Guest Lecture:*** Jeremy Elman, Ph.D., Assistant Professor, UCSD Department of Psychiatry
Tuesday November 17	***Genetics of Autism Guest Lectures:*** Lilia Iakoucheva, Ph.D. and Johnathan Sebat, Ph.D. Professors, UCSD Department of Psychiatry
Thursday November 19	***Gene Editing & CRISPR Guest Lecture:*** Victor del Amo, Ph.D. Post-Doctoral Fellow, UCSD School of Medicine *Be prepared to join in an interactive discussion with the presenter.*
Tuesday November 24	*Midterm Exam* (Lectures 10/1-11/19)

Thursday November 26	THANKSGIVING HOLIDAY
Tuesday December 1	Pharmacogenetics Cancer Genetics
Thursday December 3	Personalized Medicine Direct-to-Consumer Testing
Tuesday December 8	Eugenics *In Class Activity via Break-Out Rooms with Final Exam Groups*
Thursday December 10	DNA Fingerprinting & Crime Lab *QUIZ 6* (Lectures 12/1–12/8)

LECTURES

Lectures will be recorded and available on CANVAS. However, we recommend that you join the live lecture when possible. The benefits of synchronous 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, 9th 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

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 and your TA.

FINAL PRESENTATIONS

Students will work in groups of 4-5. Students will sign up online for their selected topic by the end of lecture on Nov 5. A 10-minute (live) oral presentations will be given online (ZOOM) by each group during the set Final Exam or alternate exam times. One copy of the slides must be submitted by each group on CANVAS by 10am PST on Thu Dec 17. Students who anticipate issues with attending the live online oral presentation should discuss options with the instructor, TA and their groups before December 1.

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.

The midterm exam will set to be completed within 80 minutes. Although the exam will be set to be completed within 80 minutes, the clock will be set for 90 minutes to provide extra time to deal with

online issues.   The exam will be available online for 24 hours beginning at 4:55 pm (PST) on November 24. Taking the exam during the designated lecture hour will enable you to interact with the instructor on ZOOM if necessary while taking the exam. The CANVAS clock starts when the exam is started and cannot be paused. Do not walk away or log off the exam and expect to come back to it at a later time. The midterm is open book, but students may not seek help of online tutoring services or other people while taking the exam. Be aware that each student will have a unique exam to prevent sharing of answers using online tools.

Quizzes will be available to take on CANVAS at 6:10pm (PST) on the date on the syllabus and remain open for 24 hours. The quizzes are designed to be completed within 10 minutes, but the clock will be set at 20 minutes or longer to accommodate for online issues. Taking the quiz at 6:10pm will enable you to interact with the instructor if necessary when taking the quiz. The lowest of the 6 quiz grades will be excluded from the computation of the total quiz grade. This should accommodate any missed quiz, for reasons such as: technical difficulties; absence due to sickness, personal or family issues, scientific presentations or conferences, or any other expected or unexpected circumstances. 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.

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.

After the grading of each exam is completed, you can view your score at the course website in Canvas by clicking "Grades" on the left menu.

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 midterm is December 3. 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 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 (eg. 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.