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<tr>
<th>Date</th>
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<th>Topic</th>
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HUMAN GENETICS 2210-001 Spring 2021
Tuesday and Thursday 10:45 am-12:05 pm on Zoom (IVC)

Format: For our safety in Spring 2021, all lecture and discussion for Biology 2210 are being offered as Instructional Video Conferencing (IVC) classes. Class and discussion sessions will be held at the scheduled times via Zoom. Quizzes and exams will also be administered via canvas during class time. Participation in the course will depend on having access to a computer and a broadband internet connection, as well as being able to use Canvas, Zoom and other online resources effectively.

If you are a student enrolled for Spring in need of a laptop or other technology equipment, see Marriott Library student checkout equipment. If you are in need of off-campus internet access, many Xfinity and Xmission public wireless locations are free to access. Xfinity Internet Essentials is free for 2 months to qualified customers and $9.95 in subsequent months. Students enrolled for Fall can request a mobile hotspot from Marriott Library student checkout equipment. See https://union.utah.edu/resources-spaces/basic-needs-center/ for additional COVID-related links. Please contact the instructor as soon as possible if you have concerns about these requirements. Further details are provided in the sections below.

Mission: I hope this course will help you understand the process of science as a way of seeking knowledge. Genetics is central to biology, so we have opportunities to sample several ways in which biologists approach the subject. Human examples are emphasized, but we also spend time on "model" organisms that permit experimental approaches not possible with humans. Genetics is NOT suited to rote memorization. "Facts" are meaningless without the context of the procedures and patterns of thought that characterize this science. Thinking scientifically takes practice! Active reading, listening, and problem solving are good practice.

Instructor: Renee Dawson, Ph.D. office hours: right after class on zoom
dawson@biology.utah.edu You questions and comments are always welcomed. When you email me, make sure to write something informative in the subject line. Blank subject lines go to the spam folder. For example Subject: Urgent- Biol 2210 Q1 early. Make sure your full “Canvas” name and Biol 2210 is in the email message. Please DO NOT use Canvas INBOX messages to contact me. They are not easy to manage and get delayed so please use my utah.edu address.

Discussion: We will focus extensively on problem-solving skills in the weekly discussion sections (often based on posted Additional Problem Sets). Your active participation is required; you cannot learn genetics by working backward from supplied answers. Many students learn best in interactive contexts, so I encourage you to also discuss practice problems in informal groups. Feel free to go to either or both discussion sections.

-002 Friday 2:45-2:50 pm zoom (IVC) Payton Utzman
-003 Friday 3:05-3:55 pm zoom (IVC) Payton Utzman
See “#1 How to Register for Connect and eBook” in Getting Started Canvas folder. $64 inclusive access fee, covers all required textbooks and course materials at a reduced cost paid with tuition. If you need to buy Connect Access and ebook at bookstore for scholarship you may request to opt out here: https://portal.verba.io/utah/login (Connect for 13th ed is required)

Reading assignments are included in the syllabus. It is important to keep up on the assigned reading and to come to class prepared to be an active participant.

Problems: Genetics can only be learned by solving problems; solving problems becomes easier with practice. Additional problem sets will be posted almost every Thursday. Some will be posted in Connect and some on Canvas. These will be the focus of the next discussion section and are essential preparation for exams. You will learn, understand and retain much more if you do the problems before discussion. If you work backwards from supplied answers you may learn how to do that problem, but you miss the opportunity to learn HOW to solve new problems. See “Study Advice” folder on CANVAS.

Canvas: Assigned Problem Sets (APS) will be posted on Canvas. These will help you learn the material and prepare for exams. I will also post slides, optional readings (articles) and additional information here. To print slides 3 or 6 per page, open slides in Powerpoint and pull down “handouts” under “Print What”. Call Help Desk 581-4000 or Media Services 581-6494 for help logging in.

Grades: 500–600 pts Scores of 90%, 80% and 70% will guarantee grades of A-, B-, and C- respectively. A full A is promised at 94%. The boundary may go down but not up.

300 pts Exams – Two midterm exams (100 points each) and a comprehensive final (100 points) determine over half of the class grade. Exams will emphasize problem solving, scientific reasoning, clear presentation of relevant information and logical arguments (not merely recitation of facts).

60 pts Quizzes – Three 20 pt quizzes to help you stay current on material between exams.

100 pts Connect – If you get 90% of available points on Connect/Learnsmart, you get 90 points. No extensions.

40 pts Articles – Write a summary and five questions for four pre approved journal articles or OMIM entries (details to be posted in Homework folder).

100 pts iClicker REEF – optional. Clickers will be used for quick, random questions to help you stay current and assess class understanding. Drop two lowest.
Rescheduled Quizzes or Exams: You can arrange to take quizzes and exams early if you have to work, have a game, go out of town, etc. Contact me in advance. At least a week notice is preferred. NO makeup exams or quizzes except in officially documented circumstances. IF you have an unplanned medical or legal emergency and are unable to make it to a quiz or exam you need to contact me immediately (or have someone do it for you). You cannot wait a few days before you talk to me. You will need official documentation saying that it was physically impossible for you to be at the exam/quiz. You were too sick and have a doctors note to verify, in a car wreck on the way and have a police report, were arrested and have documentation, etc. Unavoidable and documented issues can be made up…. not you slept in, had a cold, had a doctors appointment, weren’t ready to take the exam, etc. If your car breaks down you will need to find a way to document this (note from towing company). Plan ahead so there is time to call a friend or take the bus if you have an unreliable car.

Grading: Check the math and contact me within seven days of exam or quiz return if there are grading errors. If (after checking the text and your notes) you would like to discuss or contest your grade on specific questions please address your concerns in writing with the original graded page(s) attached. Include your email address and keep a copy of exam for yourself. Be specific and use sound scientific reasoning. (What about the question mislead you? What were you thinking? Why do you deserve partial or full credit?). Much can be learned (by both of us) by closely examining missed concepts.

How to study: Genetics is not suited to rote memorization. "Facts" are meaningless without the context of the procedures and patterns of thought that characterize this science. Thinking scientifically takes practice, and active reading, listening, and problem solving are good practice. Many students learn best in interactive contexts, so please create informal study groups outside of class. You will learn, understand and retain much more if you have good study habits starting NOW. The University recommends 2-3 hours of study outside of class for each credit hour. That means 6-9 hours per week for this class. Keep your notes and handouts in order. Learning biological terms is like learning a new language; keep a vocabulary list and look up definitions promptly. Write questions and look for 'big picture' patterns. Keep asking yourself "What is the main concept?" Compare and contrast the information. Try outlines and concept maps. The concepts build so DO NOT TRY TO CRAM!

How to Get the Most Out of Studying - Video series by Professor Stephen L. Chew, a cognitive psychologist at Samford University This is a very good resource for undergraduate students that discusses common misconceptions about learning and how to study effectively. This is a series of 5 videos, each about 7 minutes. If link is not active paste this into your Browser: https://www.youtube.com/playlist?list=PL85708E6EA236E3DB
University of Utah policies: The University of Utah drop and withdrawal dates are on the class schedule. Also see [http://registrar.utah.edu/academic-calendars/index.php](http://registrar.utah.edu/academic-calendars/index.php)

Disability accommodations: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 801-581-5020. CDS will work with you and the instructor to make arrangements for accommodations.

Wellness: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness; [www.wellness.utah.edu](http://www.wellness.utah.edu); 801-581-7776.

Students Success Advocates: SSA will help you explore and clarify your interests and goals, and overcome personal and academic challenges. [studentsuccess@utah.edu](mailto:studentsuccess@utah.edu), 801-587-8556, [http://studentsuccess.utah.edu/advocates-home/](http://studentsuccess.utah.edu/advocates-home/)

Discrimination and Harassment policies: The U has zero tolerance for any Discriminatory or Harassing behavior. Please see Student Bill of Rights, section E [http://regulations.utah.edu/academics/6-400.php](http://regulations.utah.edu/academics/6-400.php)

MUSE Project: Do you want to learn about research, community engagement, or other opportunities at the U? Check out [http://muse.utah.edu/](http://muse.utah.edu/)

Code of Student’s Rights and Responsibility [http://www.regulations.utah.edu/academics/6-400.html](http://www.regulations.utah.edu/academics/6-400.html)

Expected Learning Outcomes: At the end of the course, you should be able to:

**Mitosis and Meiosis**
Diagram each phase of the cell cycle, mitosis and meiosis, including the numbers of chromosomes present at each phase.
Distinguish between chromosome, replicated chromosomes, homologous chromosomes and sister chromatids.
Compare and contrast mitosis to meiosis.
Justify the importance of crossing over.
Predict the possible outcomes of various mistakes in meiosis.

**Transmission of Genes – Segregation and Independent Assortment**
Define and use correctly the terms: homozygous, heterozygous, dominant and recessive.
Describe and illustrate Mendel’s Laws (segregation and independent assortment).
Calculate the probability of inheritance of particular genes or traits.
Distinguish between “independent” and “dependent” events.

**Modes of inheritance and pedigrees**
Construct a pedigree from given information.
Calculate the likelihood of a genetic event based on a pedigree.
Determine which mode of inheritance is most likely based on information in a pedigree.
Variations and Extensions of Mendel's laws
Explain several possible reasons why a given genotype does not always result in the same phenotype.
Contrast the inheritance of autosomal genes with X-linked genes.
Contrast the inheritance of linked genes with unlinked genes.
Determine the order and relative distance of genes from linkage analysis.

Sexual development and dosage compensation
Distinguish how "phenotypic" sex is different from "gonadal" sex.
Explain how the outward sex characteristics can be mismatched with genetic sex.
Describe what dosage compensation is, and the basic mechanism for how it works in humans.
Compare the impact of dosage compensation on individuals with sex chromosomal abnormalities.

Molecular Genetics
Explain the “central dogma” of genetic information transfer.
Describe the relationship between chromosomes, genes and DNA.
Distinguish between the theories for how DNA replication might work, and explain how it does work.
Draw the process of transcription and explain its utility.
Diagram the processing of mRNA transcripts before translation and explain why it occurs.
Interpret how mutations might affect protein structure.

Mutations
Recognize different kinds of mutations (frameshift, insertions, deletions, point mutations) and predict their effect on amino acid sequence and protein structure.
Give examples of how DNA can be mutated.
Diagram the effects of meiotic segregation and crossover on inversions and translocations.

Applications of DNA technology
Describe the basic idea of PCR, and how/why it is used.
Interpret gel electrophoresis data, and explain how gels can be used.
Define a RFLP and STR, and how they can be used in DNA fingerprint analysis.

Cancer
Describe how cancer begins and how it spreads.
Connect the cell cycle to how cancer initiates.
Apply the principles of genetics to cancer (what genes are mutated, what else is wrong with cancer cells).

Gene Therapy
Explain the relevance of gene therapy.

Useful Links for Human Genetics
Department of Human Genetics University of Utah http://www.genetics.utah.edu

General Information
Genetics Science Learning Center learn.genetics.utah.edu
Online Mendelian Inheritance in Man www.omim.org
National Library of Medicine www.medlineplus.gov
National Institutes of Health www.nih.gov
### Genetics Societies
- American Society of Human Genetics: [www.ashg.org](http://www.ashg.org)
- American College of Medical Genetics: [www.acmg.org](http://www.acmg.org)
- American Society of Gene Therapy: [www.asgt.org](http://www.asgt.org)
- National Society of Genetic Counselors: [www.nsgc.org](http://www.nsgc.org)

### Specific Topics
- Bioethics Blog: [http://blog.bioethics.net](http://blog.bioethics.net)
- Council for Responsible Genetics: [www.councilforresponsiblegenetics.org](http://www.councilforresponsiblegenetics.org)
- Genetics and Public Policy Center: [www.DNApolicy.org](http://www.DNApolicy.org)
- Innocence Project: [www.innocenceproject.org](http://www.innocenceproject.org)
- International Society for Stem Cell Research: [www.isscr.org](http://www.isscr.org)
- National Organization for Rare Disorders: [www.rarediseases.org](http://www.rarediseases.org)
- National Cancer Institute: [www.cancer.gov](http://www.cancer.gov)

*If any of these links are broken or you find more sites that are useful, let me know.*