

**Science and Society: Genetics**  
**Course Number: PHIL 3310-090**

**Instructor Information:**

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**Class Meeting:** Online

**Office Hours:** By Appointment (Zoom, email, or Skype meetings available)

**Course Description:** Genes are the basic unit of heredity. Genes inherited from our parents play a significant role in who we are as people both in personality and physical appearance. Throughout history, genetics has been used not just for scientific purposes, but has provoked many ethical and social questions that are worth considering even within the sciences. One might ask how much genetics should be prioritized in the biological sciences? Is it ethical to use genetics to choose to have a child? How can we use genetic testing to learn more about our family's past? How can we leverage the knowledge we gain from genetic science to cure diseases and create vaccines? How do we, and should we, use genetics to bring back extinct species? What can we learn about science generally with an analysis of the practices of genetic sciences?

This class is designed to address some of these questions by sampling debates surrounding genetics in the world today with a particular focus on the intersection of philosophy with the history, biology, psychology, and sociology of genetics.. By the end of this class, students will have:

- Analyzed arguments, especially in the philosophy of science, applied ethics and epistemology, which can be applied to student's own writing and coursework in their major.
- Become familiar with the basics of what genes and genetic testing are, how the science around genetics has progressed throughout history, and how social progress has evolved alongside the science of genes and genetics.
- Appreciate how genetics has been used throughout its complex history as a means to unite families through genetic testing, while at the same time dehumanize individuals with disabilities, inspire environmental movements to bring species back from extinction, and spur progress in treating and curing diseases.
- Witness the success of knowledge generated in science through the lense of genetics.

**Reading Materials:** All readings will be provided digitally on Canvas, accessible at any time from the beginning of the semester (May 11). There may be some additions as the course unfolds. As a heads up, there will be some weeks with a heavy reading load.

## Grading

Grades will be based on the following criteria:

1. Weekly Discussion posts and responses (11 posts, 2 times per week): 40%
2. Quizzes (4 quizzes, 10-15 multiple choice each): 20%
3. Final Exam (consisting in 15 multiple choice questions and two short answer): 20%
4. One 4-6 page paper: 20%

Grade scale:

A+ = 100-97	C+ = 79-77
A = 96-93	C = 76-73
A- = 92-90	C- = 72-70
B+ = 89-87	D+ = 69-67
B = 86-83	D = 66-63
B- = 82-80	D- = 62-60
	F = 59-0

**Discussion posts.** As part of a philosophy course, it is important to have a lively interactive component. Being an online course, that is more difficult. Discussion posts are important towards engaged learning and are good for two reasons. First, obviously they give students the chance to interact, and second, it is important for effectively communicating in writing. That is why these make up the majority of your grade for this course. There are 10 discussion posts for this course. A discussion topic will be assigned for each post, located in the DP link on the course homepage. The posts consist of two parts: 1) an original response to the writing prompt, due by 11:59 pm on the Friday of that week (worth 1 point), and 2) a response to one other student's post, due by 11:59 pm on the Sunday of that week (worth 1 point).

**Quizzes.** Quizzes are designed to be a small content round-up directly following each unit. Students will complete four multiple choice quizzes on Canvas throughout the course of the semester. Quizzes will be posted on Wednesdays at noon and due on Friday by 11:59PM the weeks that they are posted. Each quiz will consist of a combination of 10-15 multiple choice and true/false questions.

**Paper.** Throughout the semester, students will have three opportunities to write their paper for this class, which will be announced at the beginning of each unit. This is in order to ensure that each student is able to write on a topic that he or she is interested in and that fits with their schedules. The papers will be 4 -6 pages (typed, double-spaced, 12-point font) and turned in on Canvas. Sample topics include: the biology and history of genetics, sociological or psychological issues related to genetics, and the ethical dimensions of genetic testing. Topics will be generated from the readings, but also from your discussion posts, so topics are to be determined.

**Final exam.** There will be two components to the final exam for this class. The first will be 15 multiple choice questions to be answered on Canvas. The second will involve short answer questions; students will choose two questions to answer from four short answer questions in total and will be required to write 1-page (roughly 500 words) for each question. The multiple choice and short answer questions will be posted in the final week of classes. The multiple choice component will have a time limit of 80 minutes; the short answer will be due July 31 by 11:59pm.

## ***Class Policies***

Classroom Civility Statement: Some weeks we will be discussing controversial topics in the course. It is essential that we maintain a safe and constructive online environment, where students with a variety of different perspectives can feel comfortable sharing their ideas and reasons for those ideas. Please be respectful, both as a speaker and a listener. Be charitable. Give coursemates the benefit of the doubt (especially if they are saying something with which you do not agree). Feel free to ask for clarifications, reasons, unstated assumptions, and evidence. Be constructive. Use the “me than three” rule for participating in a discussion. We are not trying to win a debate.

Cheating/Plagiarism: Anyone caught plagiarizing will be reported to the Dean. Students are responsible for knowing and understanding the University's Code of Conduct as it pertains to plagiarism: <http://www.admin.utah.edu/ppmanual/8/8-10.html>. In short, when you draw upon any source (class notes, an article, a website, a textbook, etc.), you must cite that source whether you are quoting from it directly or only paraphrasing it. The basic idea here is that you can draw on someone else's idea(s), but you cannot spin someone else's idea(s) as your own. Any Race Paper with evidence of plagiarism will be assigned a zero, and the student's action will be reported to the Dean.

Disability Services: 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 and Access, 162 Olpin Union Building, 801.581.5020 (V/TDD). CDA will work with you and the professor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the CDA.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

## Class Schedule

### Topic I: Reasoning and Logic

*Week 1: May 11 - 15: Informal Logic/Reasoning*

Read:

- The syllabus thoroughly and ask any questions as needed
- Cahn, Steven, Patricia Kitcher, and George Sher. 2017. Elements of Argument. Available on Canvas.
- Wade, Nicholas. 2014. "What Science Says About Race and Genetics". Available on Canvas and online: <https://time.com/91081/what-science-says-about-race-and-genetics/>

*Week 2: May 18 - 22: Deductive Logic [QUIZ 1]*

Read:

- Selections from Hardegree Chapter 2 and 3. Available on Canvas.
- Gould and Lewontin (1979) "The Spandrels of San Marco and the Panglossian Paradigm." Available on Canvas.

### Topic II: History of Genetics (Successes and Failures)

*Week 3: May 25 - 29: History of Genetics*

Read:

- Gayon, Jean. 2016. "From Mendel to epigenetics: History of genetics." Available on Canvas.

Watch:

- Enriquez, Juan. 2019. TED Talk. "The Age of Genetic Wonder." Available on Canvas and online: [https://www.ted.com/talks/juan\\_enriquez\\_the\\_age\\_of\\_genetic\\_wonder\\_feb\\_2019](https://www.ted.com/talks/juan_enriquez_the_age_of_genetic_wonder_feb_2019)

*Week 4: June 1 - 5: Human Genome Project*

Read:

- "The Human Genome Project: What is it?" Available on Canvas and online: <https://www.genome.gov/human-genome-project/What>
- "The Human Genome Project Results" Available on Canvas and online: <https://www.genome.gov/human-genome-project/results>
- Berkowitz, Ari. 2020. "Why sequencing the human genome failed to produce big breakthroughs in disease". Available on Canvas and online: <https://theconversation.com/why-sequencing-the-human-genome-failed-to-produce-big-breakthroughs-in-disease-130568>
- Wade, Nicholas. 2003. "Once Again, Scientists Say Human Genome is Complete". Available on Canvas and online: <https://www.nytimes.com/2003/04/15/science/once-again-scientists-say-human-genome-is-complete.html>

*Week 5: June 8 - 12: Eugenics [QUIZ 2]*

Read:

- Part 1: “A Short History of Eugenics” from *The Stanford Encyclopedia of Philosophy*. Available on Canvas and online: <https://plato.stanford.edu/entries/eugenics/>
- Asch, Adrienne. “Prenatal diagnosis and selective abortion: a challenge to practice and policy” in the *American Journal of Public Health*. Available on Canvas.

Watch:

- Knoepfler, Paul. 2017. TED Talk. “The Ethical Dilemma of Designer Babies.” Available on Canvas and online: [https://www.ted.com/talks/paul\\_knoepfler\\_the\\_ethical\\_dilemma\\_of\\_designer\\_babies](https://www.ted.com/talks/paul_knoepfler_the_ethical_dilemma_of_designer_babies)

### Topic III: Biology (Aims, Purposes, and Values)

*Week 6: June 15 - 19: What is a gene?*

Read:

- “Genes, DNA, and Chromosome” Available on Canvas and online: <https://www2.le.ac.uk/projects/vgec/highereducation/topics/dna-genes-chromosomes>
- Portin, Petter and Adam Wilkins. 2017. “The Evolving Definition of the Term ‘Gene’”, *Genetics*, 205(4): 1353–1364. Available on Canvas.

*Week 7: June 22 - 26 Case from Medical Genetics?*

Read:

- Heine, Steven, Benjamin Cheung, and Anita Schlamor. 2019. “Making Sense of Genetics: The Problem of Essentialism” from The Hastings Center’s Special Report: *Looking for the Psychosocial Impacts of Genomic Information*. Available on Canvas.

Listen:

- Radiolab segment. 2017. “Antibodies Part 1: CRISPR”. Available on Canvas and online: <https://www.wnycstudios.org/podcasts/radiolab/articles/antibodies-part-1-crispr>

*Week 8: June 29 - July 3: Case: Genetics of De-extinction: Resurrecting the Woolly Mammoth [QUIZ 3]*

Read:

- Black, Riley. 2020. “Can We Bring Back Mammoths From Extinction? Probably Not — Here’s Why” in *Discover Magazine*. Available on Canvas and also online: <https://www.discovermagazine.com/planet-earth/can-we-bring-back-mammoths-from-extinction-probably-not-heres-why>
- Worrall, Simon. 2017. “We Could Resurrect the Woolly Mammoth. Here's How.” in *National Geographic*. Available on Canvas and also online: <https://www.nationalgeographic.com/news/2017/07/woolly-mammoths-extinction-cloning-genetics/#close>

Watch:

- Alberto Fernandez-Arias. 2013. TEDx: “The First De-Extinction” <https://www.youtube.com/watch?v=5eMqEQw9Fbs>

### Topic IV: Sociology and Humanities of Genetics (Epistemology and Ethics)

*Week 9: July 6 - 10: Epistemology of Science*

Reading:

- Waters, C. Kenneth. 2019. An Epistemology of Scientific Practice (PSA Presidential Address). Available on Canvas.

*Week 10: July 13 - 17: Ancestry and DNA*

Read:

- Padawar, Ruth. 2018. “Sigrid Johnson Was Black. A DNA Test Said She Wasn’t” in *The New York Times*. Available online at: <https://www.nytimes.com/2018/11/19/magazine/dna-test-black-family.html>. Also available on Canvas.
- Zhang, Sarah. 2018. “A Man Says His DNA Test Proves He’s Black, and He’s Suing”, in *The Atlantic*. Available online at: <https://www.theatlantic.com/science/archive/2018/09/dna-test-race-lawsuit/570250/> Also available on Canvas.

*Week 11: July 20 - 24: Ethical Dimensions of Genetics [QUIZ 4]*

Read:

- Macur, Juliet. 2008. “Born to Run? Little Ones Get Test for Sports Gene” in *The New York Times* <https://www.nytimes.com/2008/11/30/sports/30genetics.html>
- Marcus, Amy Dockser. 2019. “The Unfulfilled Promise of Genetic Testing” in *The Wall Street Journal*. Available on Canvas and online: <https://www.wsj.com/articles/dna-testing-was-meant-to-help-treat-esmes-illness-it-created-turmoil-11558093193>

Week 12: July 27

\*\* Last day of classes July 29 \*\* Final Exam prep discussions

Finals July 30-31