

BIOL 3030—Genetics
Syllabus—Fall 2023
Utah Tech University

Instructor

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Office hours: Tues/Thurs 1–3 pm; Wed 2–3 pm

Course Details

Credits:	3
When:	MWF 3:00–3:50
Where:	SET 524
Prerequisites:	BIOL 1610
Course materials:	Recommended– <i>Genetic Analysis</i> by Sanders and Bowman

Course description

An overview of theoretical principles of transmission, cytological, molecular, and evolutionary genetics. Principles learned are applied to advanced applications in modern genetics research. Problem solving will be emphasized.

Course Learning Outcomes

The BIOL 3030 course at Utah Tech University has developed a set of program learning outcomes (PLOs). At the successful conclusion of this course, students will be able to:

- PLO 1: Outline the foundational concepts of biology including cellular, organismic, ecological, and evolutionary biology.
- PLO 2: Evaluate hypotheses, design research, test hypotheses, conduct data analysis, and draw conclusions on biology related problems.
- PLO 3: Integrate knowledge of scientific literacy in oral and written assignments when communicating biological topics.
- PLO 4: Evaluate information to discriminate between science and non-science.

Program Learning Outcomes

The Biological Sciences Department at Utah Tech University has developed a set of program learning outcomes (PLOs). The key DBS student learning outcomes that we will address in BIOL 3030 are:

- PLO 1a: Students will describe and explain molecular machinations operating within all biological processes
- PLO 1b: Students will describe and explain the centrality of genetic systems' governance of life's actions from the cellular to the phyletic.
- PLO 1c: Students will describe and explain the coordinated regulation of integrated cellular systems and their effect on the physiological functioning of organisms.
- PLO 1d: Students will describe and explain the dynamic interaction of living systems with each other and their environments.
- PLO 1e: Students will describe and explain the transforming role of evolution in changing life forms and how evolution explains both the unity and diversity of life.
- PLO 2: Students will employ scientific methods to acquire, analyze and apply knowledge of biological phenomena.
- PLO 4: Reading Comprehension: Students will analyze and critique scientific literature: identifying hypotheses, critiquing methods, interpreting data and results, and articulating the context of discussions. predications.

Course Assignments and Grading

Course points

Item	Points
Activities	125
Quizzes	280
Case Study	45
Midterm Exams	400
Final Exam	150
Total:	1000

Letter grade distribution

Percentage	Grade
≥ 90.0	A
80.0 – 90.0	B
70.0 – 80.0	C
60.0 – 70.0	D
<60.0	F

Activities

All activities will be submitted over canvas. Grades for these activities will be based on completion and effort based on the instructor's discretion. While there are a total of 25 in-class activities, the lowest two assignments will be dropped (i.e., if you miss two activities it will not hurt your grade). Because of this, no in-class activities can be turned in after the deadline.

Quizzes

A quiz is due at the end of each week. All quizzes are worth 20 pts. Quizzes will be administered via Canvas, and can be completed at any point before the due date. Quizzes will not be timed, and they will be open-note (students can use their notes and class materials), but not open-person (students cannot communicate with other people or use the notes of others).

Case Study

At the end of the semester students will use their acquired knowledge of genetics to perform a case study. This will require examination of legitimacy, feasibility, and ethics for a scenario where genetics are being applied to society. In addition to reflecting on knowledge gained during the semester, students will review additional literature on the relevant topic (starting with literature provided by the instructor). Students will be broken into small groups that will prepare a short (5-minute) presentation, which they will present during the last week of class. Use the following grading rubric to guide your presentation:

Case Study Presentation Rubric

Item	Points
Topic	23
Introduce of assigned topic in genethics	2
Describe of how principles of genetics learned during this course are relevant	5
Explain of why this topic is of ethical concern	5
Describe the primary arguments of the different perspectives	8
Is there scientific consensus regarding what is correct?	3
Case study	12
Summarize case	2
Describe the options	5
Describe the outcomes of the options	5
Conclusion	10
Why is talking about this topic worthwhile?	5
What additional information/resources would benefit this topic?	5
Total Points:	45

Exams

There are a total of five exams administered at the Utah Tech University Testing Center or over Canvas (with proctorio) throughout the semester. Four of those are during the semester (midterms) and will be available on Thursday, Friday, and Saturday of their respective weeks. Be sure to look at the syllabus and the exam schedule to know when those days are. The testing center opens at 9:00 am and closes at 10:00 pm (but the last time you can pick up a test is 9:00 pm). You will be able to take the exam at any time during those hours. Each exam will have a time limit of 3 hours- once a student begins an exam, they must finish it before the time limit is reached. Exams are open-note (students can use one page of notes [front and back]), but not open-person (students cannot communicate with other people or use the notes of others). The final exam is cumulative and will be given during the scheduled finals week. Midterm exams are worth 100 points, and the final is worth 150 points.

Substitution point opportunities

During the course of the semester, students will have opportunities to earn substitution points for in-class activities, quizzes, and/or exams. These activities will be announced in class, and must be completed before Dec 2. A substitution point is similar to an extra credit point, except once a full grade (100%) is reached, no more points can be added.

- **Seminars/Activities (substitution points for activities and quizzes)**

Various seminars and activities will be announced during the course of the semester. Students can attend these seminars and/or activities and writing a one-page (single spaced) report about the experience. The report can be submitted over Canvas under "Practice Quizzes".

- **Book Review(1/2 credit from missed points for a midterm exam)**

Students can read an approved book on genetics and critique an AI-generated book review. Use Chat GPT to create a five-page book report on the book you read. The report should consist of (1) a summary of the book [≈2 pages], (2) genetic principles elucidated within the book [≈2 pages], and (3) a discussion of how the history and genetic principles within the book enlighten the reader [≈1 page]. The student will then print the report and by-hand grade the book report by highlighting and annotating portions that aren't consistent with the content of the book, and they should also expand on sections where they feel more could be described. Students must speak with the instructor before beginning this substitution point opportunity. To be awarded the points, the student will then meet with the instructor to discuss what they learned from the book. Below is a list of pre-approved books:

- *The Monk in the Garden: The Lost and Found Genius of Gregor Mendel* by Robin Marantz Henig
- *The Secret of Life: Rosalind Franklin, James Watson, Francis Crick, and the Discovery of DNA's Double Helix* by Howard Markel
- *Thomas Hunt Morgan: Pioneer of Genetics* by Ian Shine and Sylvia Wrobel
- *A Feeling for the Organism: The Life and Work of Barbara McClintock* by Evelyn Fox Keller
- *The Genome War: How Craig Venter Tried to Capture the Code of Life and Save the World* by James Shreeve
- *The Genome Odyssey: Medical Mysteries and the Incredible Quest to Solve Them* by Euan Angus Ashley
- *The Code Breaker: Jennifer Doudna, Gene Editing, and the Future of the Human Race* by Walter Isaacson
- *War Against the Weak: Eugenics and America's Campaign to Create a Master Race* by Edwin Black
- *The Vaccine: Inside the Race to Conquer the COVID-19* by Joe Miller

Course Policies

Class Inclusiveness

It is our intent that students from all backgrounds and perspectives be well-served by this course. We are committed to creating an inclusive space that fosters diversity along its many axes: ethnicity, race, sex, gender, disability, age, socioeconomic status, nationality, and culture. As your instructor and as a student in this class, it is our shared responsibility to develop and maintain a positive learning environment for everyone. Any type of discrimination or aggression toward your peers or instructor will not be tolerated. If you experience any form of discrimination in this course, please report your concern at <https://utahtech.edu/report-a-concern/>.

Late Assignment Policy

It is very important that students submit work on time, or they will find it very difficult to catch up. All work in the course (e.g., assignments, discussions, exams, quizzes, etc.) will be due by the date noted on Canvas for each assignment. Students should reach out to their instructor immediately to discuss any concerns.

Makeup Policy

Students who miss the normal exams will need to contact the instructor and turn in the valid excuse within 48 hours from the time that the exams were given. The makeup exam schedule is determined by the instructor and will need to be done within ONE week (5 work days) from the time that the exams were given. The format, questions and difficulty-level of make-up exams are not guaranteed to be same as the normal exam, which are at the discretion of the instructors. The student and the instructor will agree upon a date and time for the makeup exam. Valid excuses include: 1). illness documented by a physician. 2) evidence of personal or family emergency. 3) official university excuses (e.g., university functions).

Instructor Communication Policy

It is your responsibility to read course announcements sent by your instructor (over Canvas and through email). Your Utah Tech University email address is the university-approved form of communication between instructors and students. Students should give the instructor 48 hours to get back to them on any communication, and one week for grading turnaround time on major assignments.

Academic Integrity

Academic dishonesty is an offense that will be reported to the UTU Academic Integrity Committee and handled by the instructor following [University Policy 555](#). Acts of academic dishonesty include group work on quizzes/exams, sharing notes, communicating quiz/exam materials, and plagiarizing materials (including using machine learning natural language processing such as ChatGPT). Please refer to the following document for further information regarding academic honesty: [UTU Academic Integrity Committee](#)

Accessibility

Students who need accommodations are asked to electronically submit their approved accommodations to the UTU Disability Resource Center. If you need accommodations but have not established them, make an appointment with [Disability Resource Center](#), North Plaza Building (Beside the Testing Center), 435-652-7516.

Generative AI

Generative AI models, such as language learning models, are recognized as valuable tools for enhancing the learning process in this course. These models are approved for guiding your learning experience, aiding in creating practice problems, and facilitating solution exploration. However, it's important to emphasize that while generative AI can support your understanding, it must not be employed to directly answer questions or complete assignments. Use of generative AI to develop practice problems and work through their solutions is encouraged as a study method. Misuse of generative AI will be considered an act of academic dishonesty in this course. If you have any uncertainties or inquiries regarding the appropriate utilization of generative AI, please reach out to the instructor. Open discussions about responsible AI implementation are welcomed, ensuring that we collectively uphold the educational value of these technologies. (This section was written with the help of chatGPT).

Important University Dates

See the [UTU Academic Calendar](#)

- Aug 22: Date classwork begins
- Aug 22: Tuition and fees due
- Aug 26: Last day to add without instructor signature
- Aug 31: Drop/Audit fee begins
- Sep 2: End of 100% Refund Period
- Sep 12: Pell Grant Census
- Sep 12: Last day to drop
- Sep 12: Last day for refund
- Sep 19: Last day to add/audit
- Oct 12: Midterm grades posted
- Oct 13-14: Fall Break (no classes)
- Oct 18: Last day to withdraw from class
- Nov 23-25: Thanksgiving Break (no classes)
- Dec 9: Date classwork ends
- Dec 12-16: Finals week
- Dec 20: Final grades posted

Useful Links

[Disability Resource Center](#)

[IT Help Desk](#)

[Library](#)

[Testing Center](#)

[Tutoring Center](#)

[Writing Center](#)

Title IX Statement

Utah Tech University affirms its commitment to the promotion of fairness and equity in all aspects of the educational institution. Harassment and discrimination – including sex/gender discrimination, gender identity, gender expression, sexual harassment, sexual misconduct, gender-based violence, dating violence, domestic violence, stalking, pregnancy or parental , family or marital status and or retaliation –not only disrupts our commitment to maintaining an environment in which every member of the University community is treated with respect and dignity, but may also violate University policy and federal, state, and/or local law.

Should you or someone you know experience behavior that is coercive, discriminatory, harassing, and or sexually violent in nature, or if you or someone you know has questions about their rights and options regarding such behavior, you are encouraged to contact:

– Hazel Sainsbury, Dir. Of Equity Compliance, Title IX Coordinator: 435-652-7747 (ext. 7747) hazel.sainsbury@utahtech.edu ; titleix@utahtech.edu

Incidents may also be reported directly to law enforcement, either separately or in conjunction with any report made to the University's Title IX Coordinator, and the University will aid in making contact if requested.

– Utah Tech University Police: 435-275-4300 or by calling 9-1-1.

Maintaining a safe and inclusive University community is a shared responsibility. For more information on how Title IX protections can benefit you and help us keep a productive campus environment, visit titleix.utahtech.edu to learn more.

Utah Tech Email Disclaimer

You are required to frequently check your Utah Tech email account as important class and university information will be sent to this account, including bills, financial aid/scholarship notices, notices of canceled classes, reminders of important dates and deadlines, course information, and other information critical to your success at UT. To access your Utah Tech email account, visit mail.utahtech.edu. Your email account username is Digital-ID@utahtech.edu (e.g. D12345678@utahtech.edu). If you don't know or have forgotten your Digital-ID or password, please visit changepassword.utahtech.edu.

References and Changes to Syllabus

The instructor will reference the syllabus when students have questions on course objectives, policies, and grading. The instructor can make changes to the syllabus during the course of the semester, but these changes will always be reasonable and announced to the class.

Schedule

Week 1 (Aug 21 – 27): Introduction and History of Genetics		
Unit 1	Topic:	Syllabus and how to succeed in this class (1.Introduction.pptx)
Unit 2	Topic:	History of Genetics (2.HistoryOfGenetics.pptx)
Saturday Aug 26	Activity:	Act 1: What do you know about DNA?
	Before 11:59 pm:	Quiz 1
Week 2 (Aug 28 – Sep 3): Cellular Division		
Unit 3	Topic:	Cell Division (3.CellDivision.pptx)
	Activity:	Act 2: What is mitosis?
	Activity:	Act 3: What is meiosis?
Unit 4	Topic:	Diversity In Genetics (4.DiversityInGenetics.pptx)
	Activity:	Act 4: Is there a geneticist like you?
Saturday Sept 2	Before 11:59 pm:	Quiz 2
End of Exam 1 material- Exam 1: Sept 7-9 (Units 1-4)		
Week 3 (Sep 4 – 10): Mendelian Genetics		
Monday Sept 4	NO CLASS	Labor Day
Unit 5	Topic:	Mendelian Genetics (5.MendelianGenetics.pptx)
	Activity:	Act 5: Genetics for Gummies
	Activity:	Act 6: Mendelian Laws
Saturday Sept 9	Due before 10 pm:	Exam 1 (available in testing center Thu-Sat)
	Before 11:59 pm:	Quiz 3
Week 4 (Sep 11 – 17): Non-Mendelian Genetics		
Unit 6	Topic:	Intro to Non-Mendelian Genetics (6.NonMendelianGenetics.pptx)
	Activity:	Act 7: Types of Non-mendelian Inheritance
Unit 7	Topic:	Epistasis (7.Epistasis.pptx)
	Activity:	Act 8: Epistasis
Saturday Sept 16	Before 11:59 pm:	Quiz 4

Week 5 (Sep 18 – 24): Multiple Inheritance Modes		
Unit 8	Topic:	Multiple Inheritance Modes (8.MultipleInheritanceModes.pptx)
Flex day(s):	Activity:	Act 9: Scenarios with multiple inheritance modes
Saturday Sept 23	Topic:	Catch up and practice problems
	Before 11:59 pm:	Quiz 5
End of Exam 2 material- Exam 2: Sept 28-30 (Units 5-8)		
Week 6 (Sep 25 – Oct 1): Gene Linkage		
Unit 9	Topic:	Gene Linkage and Recombination (9.GeneLinkageAndRecombination.pptx)
Flex day(s):	Activity:	Act 10: Dihybrid Cross
Saturday Sept 30	Topic:	Act 11: Three-point Test Cross
	Before 11:59 pm:	Catch up and practice problems
	Due before 10 pm:	Exam 2 (available in testing center Thu-Sat)
	Before 11:59 pm:	Quiz 6
Week 7 (Oct 2 – 8): Cytogenetics		
Unit 10	Topic:	Cytogenetics (10.Cytogenetics.pptx)
Unit 11	Activity:	Act 12: Chromosomes and Karyograms
	Topic:	Genome Complexity (11.GenomeComplexity.pptx)
	Activity:	Act 13: What contributes to genome complexity?
	Before 11:59 pm:	Quiz 7
End of Exam 3 material- Exam 3: June 29 - July 1 (Units 9-11)		
Week 8 (Oct 9 – 15): Molecular Genetics - Central Dogma		
Unit 12	Topic:	Central Dogma (12.MolecularGenetics-CentralDogma.pptx)
Oct 12 – 15	Activity:	Act 14: Replication
	Activity:	Act 15: Transcription
	NO CLASS	Fall Break
Week 9 (Oct 16 – 22): Molecular Genetics- Mutation		
Unit 12 (cont.)	Topic:	Central Dogma (12.MolecularGenetics-CentralDogma.pptx)
Unit 13	Activity:	Act 16: Translation
	Topic:	Mutation (13.MolecularGenetics-Mutation.pptx)
	Activity:	Act 17: PCR
Saturday Oct 21	Activity:	Act 18: Sanger Sequencing
	Before 10 pm:	Exam 4 (available in testing center Thu-Sat)
	Before 11:59 pm:	Quiz 8
Week 10 (Oct 23 –29): Molecular Gen- Population Genetics		
Unit 14	Topic:	Evolution and Religion (15.EvolutionAndReligion.pptx)
Unit 15	Topic:	Molecular Evolution (14.MolecularGenetics-Evolution.pptx)
	Activity:	Act 19: Hardy-Weinberg Equilibrium
Saturday October 28	Activity:	Act 20: Selection
	Before 11:59 pm:	Quiz 9
Week 11 (Oct 30 – Nov 5): Molecular Gen- Phylogenetics		
Unit 15 (cont.)	Topic:	Molecular Evolution (14.MolecularGenetics-Evolution.pptx)
Flex day(s):	Activity:	Act 21: Phylogenetics
Saturday July 29	Topic:	Catch up and practice problems
	Before 11:59 pm:	Quiz 10. No substitution point activities can be submitted after this.
End of Exam 4 material- Exam 4: July 20-22 (Units 12-15)		
Week 12 (Nov 6 – 12): Gene Editing		
Unit 16	Topic:	Reading Scientific Literature (16.ReadingScientificLiterature.pptx)
Unit 17	Activity:	Act 22: Read a paper
Unit 18	Topic:	CRISPR-CasX and Gene Drives
	Topic:	Reviewing Kyrou et al. (2018)
Saturday Nov 11	Activity:	Act 23: Paper Discussion
	Due before 10 pm:	Exam 3 (available in testing center Thu-Sat)
	Before 11:59 pm:	Quiz 11
Week 13 (Nov 13 – 19): Genomics		
Unit 19	Topic:	Genomic Sequencing (19.Genomics.pptx)
Unit 20	Activity:	Act 24: Genomic sequencing approaches and technology
	Topic:	Bioinformatics (20.Bioinformatics.pptx)
Friday August 4	Activity:	Act 25: Design a Genomics Experiment
	Before 11:59 pm:	Quiz 12
Week 14 (Nov 20 – 26): Advanced Genethics		
Unit 21	Topic:	Genethics (21.Genethics.pptx)
Nov 22 – 26	NO CLASS	Thanksgiving Break
Week 15 (Nov 27 – Dec 3): Case Studies		
Unit 21 (cont.)	Topic:	Genethics (21.Genethics.pptx)
Case Study Presentations	Topic:	Students will present case studies
Saturday Dec 2	Before 11:59 pm:	Quiz 13. No substitution point activities can be submitted after this.
Week 16 (Dec 4 – 10): Course Overview		
Monday	Topic:	Units 1-8
Wednesday	Topic:	Units 9-14
Friday	Topic:	Units 15-21
Saturday Dec 9	Before 11:59 pm:	Quiz 14
Finals Week (Dec 11 – 17)		
Monday, Dec 11	3:00 – 4:50 pm	Final Exam (SET 524)